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L7 16 LSAASWTQSIYFLLD RFRGTDNS/SQSP

=> s l7 and sql=484
L8 72339 SQL=484
6 L7 AND SQL=484

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SINCE FILE TOTAL
ENTRY SESSION
150.20 150.41
FULL ESTIMATED COST

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FILE LAST UPDATED: 8 AUG 2007 (20070808/ED)

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=> s l8
L9 6 L8
=> d l9 1-6

L9 ANSWER 1 OF 6 HCAPLUS COPYRIGHT 2007 ACS on STN
AN 2005:1261024 HCAPLUS
DN 144:5525
TI Production of ethanol from enzymatically hydrolyzed starch
IN Bhargava, Swapnil; Frisner, Henrik; Bisgard-Frantzen, Henrik; Tams, Jeppe Wegener
PA Novozymes North America, Inc., USA; Novozymes A/S
SO PCT Int. Appl., 54 pp.
CODEN: PIXXD2

DT Patent
LA English
FAN.CNT 1
PATENT NO. KIND DATE APPLICATION NO. DATE
PI WO 2005113785 A2 20051201 WO 2005-US16390 20050511
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GR, GU, HU, ID, IL, IN, IS, JP, KE, KG, KM, KP, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MY, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, VZ, VC, VN, YU, ZA, ZM, ZW

RW: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, GU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, BU, CF, CG, CI, CM, GA, GG, GW, ML, MR, NE, SN, TD, TG
CA 2566252 A1 20051201 CA 2005-2566252 20050511
EP 1751295 A2 20070214 EP 2005-754334 20050511
R: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LI, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, AL, BA, HR, LV, MK, YU 20070622 IN 2006-CN4176 20061113
IN 2006CN04176 A 20070622
PRAI US 2004-570727P P 20040513
US 2004-632201P P 20041201
US 2004-632293P P 20041203
WO 2005-US16390 W 20050511
L9 ANSWER 2 OF 6 HCAPLUS COPYRIGHT 2007 ACS on STN
AN 2005:1075548 HCAPLUS
DN 143:345492
TI Enzymic starch liquefaction process for improved ethanol production
IN Bhargava, Swapnil; Bisgard-Frantzen, Henrik; Frisner, Henrik; Vikso-Nielsen, Anders; Johal, Malcolm
PA Novozymes North America, Inc., USA; Novozymes A/S
SO PCT Int. Appl., 30 pp.
CODEN: PIXXD2
DT Patent
LA English
FAN.CNT 2
PATENT NO. KIND DATE APPLICATION NO. DATE
PI WO 2005092015 A2 20051006 WO 2005-US9218 20050318
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GR, GU, HU, ID, IL, IN, IS, JP, KE, KG, KP, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, VZ, VC, VN, YU, ZA, ZM, ZW
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US 2007141689 A1 20070621 US 2006-593164 20061018
PRAI US 2004-554615P P 20040319
US 2004-575133P P 20040528
WO 2005-US9218 W 20050318

L9 ANSWER 3 OF 6 HCAPLUS COPYRIGHT 2007 ACS on STN
AN 2005:696593 HCAPLUS
DN 143:192412
TI Processes for producing a fermentation product, such as ethanol, from milled starch without gelatinization using glucoamylase from Athelia rolfsii and acid α -amylase
IN Allain, Eric; Wenger, Kevin S.; Bisgard-Frantzen, Henrik
SO PCT Int. Appl., 96 pp.
CODEN: PIXXD2
DT Patent
LA English
FAN.CNT 2
PATENT NO. KIND DATE APPLICATION NO. DATE
PI WO 2005069840 A2 20050804 WO 2005-US1147 20050114

LA English
FAN.CNT.1

PI WO 2004080923 A2 20040923 WO 2004-DK154 20040310
WO 2004080923 A3 20041216
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, FR, GB, GD, GE, GH, GM, GR, GU, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MX, MY, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, VZ, VN, YU, ZA, ZM, ZW
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EP 1745122 A2 20070124 EP 2005-711438 20050114
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PRAI US 2004-537071P P 20040116
WO 2004-636013P P 20041214
WO 2005-US1147 W 20050114

L9 ANSWER 4 OF 6 HCAPLUS COPYRIGHT 2007 ACS on STN
AN 2004:1059495 HCAPLUS
DN 142:22620
TI Brewing with simultaneous saccharification of starch
IN Olsen, Hans Sejr.; Norman, Barrie Edmund; Wuempelmann, Mogens; Tams, Jeppe Wegener
PA Novozymes A/S, Den.
SO PCT Int. Appl., 43 pp.
CODEN: PIXMD2
DT Patent
LA English
FAN.CNT.1

PI WO 2004106533 A1 20041209 WO 2004-DK373 20040528
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, FR, GB, GD, GE, GH, GM, GR, GU, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MY, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, VZ, VN, YU, ZA, ZM, ZW
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EP 1633878 A1 20060315 EP 2004-735196 20040528
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CN 1798847 A 20060705 CN 2004-80015139 20040528
US 2007031952 A1 20070208 US 2005-558552 20051128
PRAI DK 2003-812 A 20030530
WO 2004-DK373 W 20040528

RE.CNT.11 THERE ARE 11 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L9 ANSWER 5 OF 6 HCAPLUS COPYRIGHT 2007 ACS on STN
AN 2004:780639 HCAPLUS
DN 141:294792
TI Alcohol product processes
IN Olsen, Hans Sejr.; Pedersen, Svend; Festeren, Rikke Monica
PA Novozymes A/S, Den.
SO PCT Int. Appl., 43 pp.
CODEN: PIXMD2
DT Patent

LA English
FAN.CNT.1

PI WO 2004080923 A2 20040923 WO 2004-DK154 20040310
WO 2004080923 A3 20041216
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EP 1745122 A2 20070124 EP 2005-711438 20050114
R: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LI, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, UA, UG, US, VZ, VN, YU, ZA, ZM, ZW
PRAI US 2004-537071P P 20040116
WO 2004-636013P P 20041214
WO 2005-US1147 W 20050114

L9 ANSWER 6 OF 6 HCAPLUS COPYRIGHT 2007 ACS on STN
AN 2002:368675 HCAPLUS
DN 136:385041
TI Secondary starch liquefaction in fermentation ethanol production
IN Veit, Christopher; Felby, Claus; Fuglsang, Claus Crone
PA Novozymes A/S, Den.; Novozymes North America, Inc.
SO PCT Int. Appl., 33 pp.
CODEN: PIXMD2
DT Patent
LA English
FAN.CNT.1

PI WO 2002038787 A2 20020516 WO 2001-DK737 20011109
WO 2002038787 A3 20020926
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, FR, GB, GD, GE, GH, GM, GR, GU, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MY, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, VZ, VN, YU, ZA, ZM, ZW
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AU 200213841 A 20020521 AU 2002-13841 20011109
EP 1335982 A2 20030820 EP 2001-982195 20011109
R: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, GU, HU, IE, IS, IT, LI, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, UA, UG, US, VZ, VN, YU, ZA, ZM, ZW
US 2004091383 A1 20040513 20030509
US 7244597 B2 20070717 20070108
US 2007155001 A1 20070705 20070108
PRAI DK 2006-1676 A 20001110 20001121
DK 2000-252213P P 20001211 20001215
DK 2000-1854 A 20001211 20001215
US 2000-256015P P 20001215 20001215
WO 2001-DK737 W 20011109 20011109
US 2003-416393 A3 20030509 20030509

=> index bioscience
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FULL ESTIMATED COST
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68 FILES IN THE FILE LIST IN STNINDEX

Enter SET DETAIL ON to see search term postings or to view
search error messages that display as 0* with SET DETAIL OFF.

=> s gelatiniz? (p) (alpha (w) amylase) (p) glucoamylase

0* FILE ADISNEWS
3 FILE AGRICOLA
0* FILE ANTE
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13 FILE CABA
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3* FILE CRABA-VTB
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114 FILE DGENE
2 FILE DISSABS
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1 FILE EMBASE
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0* FILE FOMAD
0* FILE FORGE
9* FILE FROSTI
45* FILE FSTA
37 FILE IFIPAT
0* FILE KOSMET
4 FILE LIPESCI
2 FILE MEDLINE
1* FILE NTIS
0* FILE NUTRACUT
14* FILE PASCAL
0* FILE PHARMAML
1 FILE PROMT
15 FILE SCISEARCH
4 FILE TOXCENTER
97 FILE USPATFULL
61 FILES SEARCHED...
9 FILE USPAT2
0* FILE WATER
24 FILE WPIDS
24 FILE WPINDEX

26 FILES HAVE ONE OR MORE ANSWERS, 68 FILES SEARCHED IN STNINDEX

L10 QUE GELATINIZ? (P) (ALPHA (W) AMYLASE) (P) GLUCOAMYLASE

=> file biosis, hcaplus, scisearch
COST IN U.S. DOLLARS
SINCE FILE ENTRY TOTAL
SESSION

FULL ESTIMATED COST 1.89 174.98

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L11 107 L10

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L12 69 DUP REM L11 (38 DUPLICATES REMOVED)

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L13 15 L12 AND ASPERGILLUS

=> s l12 and beer

L14 0 L12 AND BEER

=> d l12 30-35 ibib, kwic

L12 ANSWER 30 OF 69 BIOSIS COPYRIGHT (c) 2007 The Thomson Corporation on
STN DUPLICATE 12

ACCESSION NUMBER: 1993:387449 BIOSIS

DOCUMENT NUMBER: PREV199396062749

TITLE: Structure of tapioca pearls compared to starch noodles from mung beans.

AUTHOR(S): Xu, Ansui [Reprint author]; Seib, Paul A.

CORPORATE SOURCE: Am. Maize-Prod. Co., Hammond, IN, USA

SOURCE: Cereal Chemistry, (1993) Vol. 70, No. 4, pp. 463-470.

CODEN: CECHAF. ISSN: 0009-0352.

DOCUMENT TYPE: Article

LANGUAGE: English

ENTRY DATE: Entered STN: 23 Aug 1993

Last Updated on STN: 28 Sep 1993

AB Commercial tapioca pearls contain approximately 60% *gelatinized*

starch, as determined by differential scanning calorimetry and

glucoamylase digestibility. Exhaustive digestions showed that 2,

5, and 6% of cooked tapioca pearls were resistant to *alpha-*

amylase, acid (1M HCl at 35 degree C), and to a combination of

isoamylase and beta-amylase, respectively, whereas digestion of cooked.

. of resistant residues. All the resistant residues gave the

B-polymorphic X-ray pattern typical of retrograded starch. At 75%

moisture, the *alpha-amylase*-resistant residue did not

melt below 147 degree C, whereas the acid-resistant residue melted at 128

degree C (T-p), and the isoamylase and beta-amylase-resistant residue

melted at 92 degree C (T-p). Size-exclusion chromatography showed that

the *alpha-amylase*-resistant residues contained unit

chains with a peak at a number-average degree of polymerization (DP-n) of

33-37, and the acid-resistant residues.

L12 ANSWER 31 OF 69 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 1993:558571 HCAPLUS

DOCUMENT NUMBER: 119:158571

TITLE: Characteristic change of various starch granules by enzymatic treatment. I. Characteristic change of rice starch granules by enzymatic treatment

AUTHOR(S): Fukai, Yohichi; Takaki, Etsuko; Kobayashi, Shoichi
 CORPORATE SOURCE: Agric. Technol. Inst. Nagano Farmers' Fed., Suzaka, 382, Japan
 SOURCE: Denpun Kagaku (1993), 40(3), 263-9
 CODEN: DPNKAV; ISSN: 0021-5406

DOCUMENT TYPE: Japanese
 LANGUAGE: Japanese

AB Rice starch granules were treated with *alpha*-amylase and *glucoamylase*, and β -amylase under various conditions and changes in the characteristics of the starch granules due to enzyme treatments were investigated. *Glucoamylase* and *alpha*-amylase degraded rice starch granules and made many holes in their surfaces, whereas, β -amylase had little degrading effect. From observations by scanning electron microscopy, it was found that the holes made by *alpha*-amylase were large and deep. Also β -amylase made deeper holes than those of *alpha*-amylase. The number and size of the holes increased with the degree of the enzymic degradation. The starch granules were treated by *alpha*-amylase until the degree of degradation reached the range of *alpha*-amylase 0.5-approx.3.0%, and then, the suspension of the granules was subjected to a micro-viscog. anal. The amount of *alpha*-amylase adsorbed on the surface of the starch granule was 0.36-4.8 IU/g over the range of degradation. The starch granules adsorbing the enzymes were gelatinized and yielded a thin paste. However, no marked change in the rheol. properties of the starch granules treated with β -amylase or *glucoamylase* was observed even when the degradation was large, when compared with those of the granules prior to treatment.

L12 ANSWER 32 OF 69 HCAPLUS COPYRIGHT 2007 ACS on STN
 ACCESSION NUMBER: 1992:429134 HCAPLUS
 DOCUMENT NUMBER: 117:29134

TITLE: Preparation of cereal starch hydrolyzates containing at least 95% glucose
 INVENTOR(S): Anger, Horst; Richter, Manfred; Kettlitz, Bernd; Schirner, Rolf; Haeusler, Gerhard; Roick, Thomas
 PATENT ASSIGNEE(S): Zentralinstitut fuer Ernaehrung, Germany
 SOURCE: Ger. (East), 5 pp.
 CODEN: GEXA88

DOCUMENT TYPE: Patent
 LANGUAGE: German
 FAMILY ACC. NUM. COUNT: 1
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
DD 298431	A5	19920220	DD 1989-332057	19890824
			DD 1989-332057	19890824

AB In the title process, giving products for food and tech. use, aqueous suspensions of 20-30% starch are treated with *glucoamylase* (I) and small amts. of *alpha*-amylase (II) at pH 3.5-5.5 and temps. 53° above the gelatinization temperature of the starch used for 12-36 h and the hydrolyzate is separated from unreacted starch. Stirring 500 g aqueous slurry of 146 g rye starch (85.6% dry solids) with 50 mg NaHSO₃, 10 mg bacterial II (17,910 units/g), and 1.6 mL I from Endomycopsis bispora (2863 units/mL) at pH 5 and 54° for 48 h. After centrifuging, and washing the solids with H₂O gave an 82.1% solution of hydrolyzate containing glucose 95.3, disaccharides 1.9, and 1.1% oligosaccharides (based on solids).

L12 ANSWER 33 OF 69 HCAPLUS COPYRIGHT 2007 ACS on STN DUPLICATE 13
 ACCESSION NUMBER: 1993:79668 HCAPLUS
 DOCUMENT NUMBER: 118:79668

TITLE: Kinetics of enzymic hydrolysis of cassava flour starch - optimization and modelling

AUTHOR(S): Waliszewski, Krysztof N.; Garcia Alvarado, Miguel; De la Cruz Medina, Javier
 CORPORATE SOURCE: Inst. Technol., Veracruz, Mex.
 SOURCE: International Journal of Food Science and Technology (1992), 27(4), 465-72
 CODEN: IJFTEZ; ISSN: 0950-5423

DOCUMENT TYPE: Journal
 LANGUAGE: English

AB This study was conducted to model the kinetics of cassava flour hydrolysis by Miles Taka-Therm L-170 *alpha*-amylase and Diastzyme L-200 *glucoamylase* to produce glucose syrup. Maximum starch concentration was 31% due to a controlled process of flour gelatinization by gradual temperature increase, and parallel starch hydrolysis by thermostable *alpha*-amylase activity, preventing excess viscosity. The time of hydrolysis was two and half hours of *alpha*-amylase activity and 36 h of *glucoamylase* activity with the final yield of 90-93% of glucose. Exponential hyperbolic models were obtained to predict the kinetics of hydrolysis by both amylase and *glucoamylase*, with a generalized correlation coefficient >0.94.

L12 ANSWER 34 OF 69 HCAPLUS COPYRIGHT 2007 ACS on STN
 ACCESSION NUMBER: 1992:424906 HCAPLUS
 DOCUMENT NUMBER: 117:24906

TITLE: Twin-screw extrusion cooker as a bioreactor for starch processing
 AUTHOR(S): Linko, Pekka
 CORPORATE SOURCE: Helsinki Univ. Technol., Espoo, Finland
 SOURCE: Food Science and Technology (New York, NY, United States) (1992), 49(Food Extrusion Sci. Technol.), 335-44
 CODEN: FSTEEM; ISSN: 0891-8961

DOCUMENT TYPE: Journal
 LANGUAGE: English

AB Most work described was done either by a Clextral BC 45 or with a Werner and Pfleiderer Continua 58 twin-screw extruder. The length of the screws in the former was 600 mm with 50 mm reverse pitch elements at the die end, and in the latter, 1222.5 mm with 75 mm reverse screw elements were placed at 470 mm distance for efficient starch gelatinization, and 3 short mixing elements at 590 mm, 835 mm, and 1080 mm distance from the beginning. The feed rate was kept constant at about 12 kg/h (d.m.) and 30 kg/h (d.m.), resp. Industrial grade barley and wheat starch, and milled whole barley and oats were used as raw material. Thermostable Bacillus licheniformis *alpha*-amylase Termamyl was used for liquefaction, and either Aspergillus niger *glucoamylase* 150L or barley β -amylase (ABM 1500L) and Klebsiella aerogenes pullulanase (ABM pullzyme S 2000) were used for saccharification. The state of the are in the novel concept of using a twin-screw extrusion cooker as a continuous bioreactor in starch processing is presented.

L12 ANSWER 35 OF 69 HCAPLUS COPYRIGHT 2007 ACS on STN
 ACCESSION NUMBER: 1993:253761 HCAPLUS
 DOCUMENT NUMBER: 118:253761

TITLE: Properties of α -amylase and *glucoamylase* from Aspergillus awamori

AUTHOR(S): Yasuda, Masaki; Yamada, Takeshi; Ishihara, Masanobu; Toyama, Seizen
 CORPORATE SOURCE: Coll. Agric., Univ. Ryukyus, Okinawa, 903-01, Japan
 SOURCE: Ryukyu Daigaku Nogakubu Gakujutsu Hokoku (1992), 39, 125-34
 CODEN: RDNGBN; ISSN: 0370-4246

DOCUMENT TYPE: Journal
 LANGUAGE: Japanese

AB The properties of *alpha*-amylase and *glucoamylase* from a selected strain (Aspergillus awamori Nakazawa,

IFO 4033) for awamori beverage production were investigated. **alpha**
-Amylase had maximum activity at pH 4.5-5.5 and 65° and was
quite stable at pH 3.0-6.0 and up to 60°. **Glucosylase**
had maximum activity at pH 4.3-5.5 and 60° and was stable at pH
3.5-6.0 and up to 60°. **Glucosylase** was active on
gelatinized starch prepared from glutinous rice, nonglutinous rice,
broken rice imported from Thailand (raw material for awamori beverage,
indica type), potato, sweet potato, wheat, corn and soluble starch. The
hydrolysis degree of starch prepared from broken rice of Thailand was
rapidly increased with time up to 2 h. The limit of hydrolysis of the
starch by the enzyme was 84%. The enzyme could digest raw rice starch
maximally at pH 3.2-3.5. The enzyme was very active on raw starch of
glutinous, nonglutinous, and broken rice but was only slightly active on
a raw potato starch.

=> d 112 1-69 ibib, kwic

L12 ANSWER 1 OF 69 HCAPLUS COPYRIGHT 2007 ACS on STN
ACCESSION NUMBER: 2006:632753 HCAPLUS
DOCUMENT NUMBER: 145:98570
TITLE: Chimeric α -amylases comprising catalytic and
carbohydrate-binding modules and the use for starch
processing
INVENTOR(S): Fukuyama, Shiro; Matsui, Tomoko; Soong, Chee-Leong;
Allain, Eric; Vikso-Nielsen, Anders; Udagawa, Hiroaki;
Liu, Ye; Duan, Junxin; Wu, Wenping; Andersen, Lene
Nonboe; Landvik, Sara
PATENT ASSIGNEE(S): Novozymes A/S, Den.; Novozymes North America, Inc.
SOURCE: PCT Int. Appl., 340 pp.
CODEN: PIXXD2

DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 2
PATENT INFORMATION:
PATENT NO. KIND DATE APPLICATION NO. DATE
WO 2006069290 A2 20060629 WO 2005-US46725 20051222
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH,
CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD,
GE, GH, GM, GR, HU, ID, IL, IN, IS, JP, KE, KM, KN, KP, KR,
KZ, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX,
MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE,
SG, SK, SL, SM, SY, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VC,
VN, YU, ZA, ZM, ZW
RW: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE,
IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ,
CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG, BW, GH,
GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZW, AM, AZ, BY,
KG, KZ, MD, MG, TJ, TM, AP, EA, EP, OA
AU 2005119074 AU 2005-319074 20051222
A1 20060706 US 2005-316535 20051222
US 2006148054 A1 20060706 US 2005-315730 20051222
US 2006172403 A1 20060803 US 2005-315730 20051222
PRIORITY APPLN. INFO.:
US 2004-638614P P 20041222
US 2005-650612P P 20050207
WO 2005-US46725 W 20051222

AB The present invention is based on the discovery that by adding or
exchanging a carbohydrate-binding module (CBM) in certain **alpha**
-amylases, the enzymic activity and specificity can be altered.
Selecting a catalytic domain with desired properties (e.g., pH profile,
temperature profile, oxidation resistance, calcium stability, substrate
affinity,

or product profile) can be combined with a DBM with stronger or weaker
binding affinities. The hybrids have altered properties relative to
alpha-amylase without the CBM and/or relative to prior
art amylases, such as having increased stability and/or activity at low pH
(pH less than 4), increased activity towards granular starch, and/or
increased degradation of granular starch at low pH even in the absence of
glucosylase or at low **glucosylase** levels, and/or with
altered product profile. Preferred are any CBM amino acid sequence
selected from the group consisting of *Athelia rolfsii glucosylase*
, *Pachytopora papayracea glucosylase*, *Valsaria rubricosa*,
alpha-amylase, and *Meripilus giganteus alpha*
-amylase. Due to the superior hydrolysis activity of these
polypeptides, the overall starch conversion process can be performed
without having to **gelatinize** the starch; the polypeptides
hydrolyze granular starch in a raw starch process as well as fully or
partially **gelatinized** starch in a traditional starch process.

L12 ANSWER 2 OF 69 HCAPLUS COPYRIGHT 2007 ACS on STN
ACCESSION NUMBER: 2006:1352515 HCAPLUS
DOCUMENT NUMBER: 146:128197
TITLE: Characterization of starches from tuber of *Pinellia*
ternata (Thunb.) Breitenbach, rhizome of *Alisma*
orientale Juzepczuk and seed of *Coix lacryma-jobi*
Linne var. *ma-yuen Stapf*
Boki, Keito; Yamada, Yoshihide; Kitakouji, Manabu
FAC. Pharm. Sci., Kinki University, Higashiosaka,
577-8502, Japan
CORPORATE SOURCE:
SOURCE: Journal of Applied Glycoscience (2006), 53(4), 241-247
CODEN: JAGLFX; ISSN: 1344-7882
PUBLISHER: Japanese Society of Applied Glycoscience
DOCUMENT TYPE: Journal
LANGUAGE: English

AB Various physicochem. properties were investigated to assess the potential
of starches from the residual crude drugs after extraction. The powdered crude
drugs (C) differed from each other in harvest time or district of
cultivation. Starches (s) were prepared from tubers of *Pinellia ternata*
(Thunb.) Breitenbach (PT), rhizomes of *Alisma orientale Juzepczuk* (AO) and
seeds of *Coix lacryma-jobi* Linne var. *ma-yuen Stapf* (CL). C-PTS, C-AOS
and C-CLS contained 41.4-77.5, 12.5-40.5 and 1.5-5.8% starch, resp. S-PT,
S-AO and S-CL granules measured were 8.2 ± 0.2 , 16.0 ± 0.4 , $6.1 \pm$
 0.2 and 11.5 ± 0.4 μ m, resp., in average diameter. S-PTS, S-AOS
and S-CLS were classified as CA-type. The amount of P in S-PTS, S-AOS
320-530, 48-260 and 18-33 μ g/g, resp. S-PT-1, S-AO-2 and S-CL-2 showed
endothermic curves from 67.3 to 85.0, 58.9 to 84.2 and 59.2 to
81.0°, their enthalpy being 3.4 ± 0.3 , 4.2 ± 0.0 and $4.5 \pm$
 0.2 J/g, resp. S-PT-1, S-AO-2 and S-CL-2 are expected to be available for
starch **gelatinized** at low energy. The digestibility of raw
S-PTS, S-AOS and S-CLS by **alpha**-amylase was 35.3
 ± 2.4 , 38.3 ± 2.3 and $62.2 \pm 5.2\%$, resp., at 72 h. The main
oligosaccharide products from the raw starches (digestibility: S-PT-1,
2.4%; S-AO-2, 5.8%; S-CL-2, 7.1%) digested by **alpha**-
amylase were maltotriose (35.8-40.0%) and maltose (35.8-42.8%).
The main product from the starches digested by **glucosylase**
12.1%, S-CL-2, 18.1%) digested by **glucosylase** was glucose
(97.6-99.5%). The digested S-PT-1, S-AO-2 and S-CL-2 granules (digestion
time, 1 h) were roughly eroded by **alpha**-amylase all
over the surface and the starches digested by **glucosylase**
maintained their original form with a few fine grains on their surface. A
few granules of S-CL-2 digested by **glucosylase** lost their
original form. The S-PT-1(A), S-AO-2(A) and S-CL-2(A) digested by
alpha-amylase are expected to be available as an
adsorbent, because of their porosity. The results of
gelatinization temperature and enthalpy suggest that the thermostability

of S-PT-1, S-AO-2 and S-CL-2 digested by **.alpha.-amylase** was higher than that of the starches digested by **glucoamylase**.

L12 ANSWER 3 OF 69 HCAPLUS COPYRIGHT 2007 ACS on STN
ACCESSION NUMBER: 2006:594761 HCAPLUS
DOCUMENT NUMBER: 145:484937
TITLE: Development of new α -amylases for raw starch hydrolysis
AUTHOR(S): Viksoe-Nielsen, Anders; Andersen, Carsten; Hoff, Tine; Pedersen, Sven
CORPORATE SOURCE: Novozymes A/S, Bagsvaerd, DK-2880, Den.
SOURCE: Biocatalysis and Biotransformation (2006), 24(1/2), 121-127
CODEN: BOBOQ; ISSN: 1024-2422
PUBLISHER: Taylor & Francis Ltd.
LANGUAGE: English
REFERENCE COUNT: 24
AB THERE ARE 24 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT
AB This paper describes the discovery of a new 4 domain **.alpha.-amylase** from Anoxybacillus contaminans which very efficiently hydrolyzes raw starch granules. Compared to traditional starch liquefying **.alpha.-amylases**, this new 4 domain **.alpha.-amylase** contains a starch binding domain. The presence of this starch binding domain enables the enzyme to efficiently hydrolyze starch at a temperature below the **gelatinization** temperature. At a reaction temperature of 60°C and in combination with a **glucoamylase** from Aspergillus niger it was possible to liquefy 99% of the starch obtaining a DX value of 98%. Furthermore, we describe how the current HPCS (high fructose corn syrup) process can be turned into a low temperature simultaneous liquefaction and saccharification process by using this new 4 domain **.alpha.-amylase** in combination with a **glucoamylase**.
INVENTOR(S): Allain, Eric; Wenger, Kevin S.; Bisgaard-Frantzen, Henrik
PATENT ASSIGNEE(S): Novozymes North America, Inc, USA; Novozymes A/S
SOURCE: PCT Int. Appl., 96 pp.
CODEN: PIXXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 2
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2005069840	A2	20050804	WO 2005-US1147	20050114
W:	AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GR, GU, HU, IL, IN, IS, JP, KE, KG, KP, KZ, LC, LK, LR, LS, LU, LV, MA, MD, MG, MK, MN, MW, MX, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW			
RM:	BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK,			

BE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, SI, TD, TG
EP 1745122 A2 20070124 EP 2005-711438 20050114
R: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LI, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, AU, BA, HR, LV, MK, YU
US 2004-537071P P 20040116
US 2004-636013P P 20041214
WO 2005-US1147 W 20050114
TI Processes for producing a fermentation product, such as ethanol, from milled starch without **gelatinization** using **glucoamylase**
AB The present invention provides processes of producing a fermentation product from starch-containing material, such as granular starch, without **gelatinization** of said starch-containing material using **glucoamylase**. The processes for producing a fermentation product, such as ethanol, from milled starch-containing material comprise (a) saccharifying the milled starch-containing material with a **glucoamylase** (EC 3.2.1.3) at a temperature below the initial **gelatinization** temperature of said starch-containing material, (b) fermenting using a fermenting organism. The preferred **glucoamylase** is one from Athelia rolfsii or its homologs. In a preferred embodiment an **.alpha.-amylase** (EC 3.2.1.1) may be added to the process of the invention, such as one from Aspergillus or Bacillus. In another embodiment a hybrid enzyme is used comprising catalytic domain (CD) and a carbohydrate-binding module (CBM) derived from an **.alpha.-amylase** mutant or a **glucoamylase**.
IT Enzyme functional sites
IT (active, hybrid **amylase** comprising; processes for producing fermentation product, such as ethanol, from milled starch without **gelatinization** using **glucoamylase** from Athelia rolfsii and acid α -**amylase**)
IT Gelation
IT (at temperature below initial; processes for producing fermentation product, such as ethanol, from milled starch without **gelatinization** using **glucoamylase** from Athelia rolfsii and acid α -**amylase**)
IT Temperature
IT (below initial **gelatinization**; processes for producing fermentation product, such as ethanol, from milled starch without **gelatinization** using **glucoamylase** from Athelia rolfsii and acid α -**amylase**)
IT Organ, plant
IT (cob, starch from; processes for producing fermentation product, such as ethanol, from milled starch without **gelatinization** using **glucoamylase** from Athelia rolfsii and acid α -**amylase**)
IT Fusion proteins (chimeric proteins)
IT RL: BUU (Biological use, unclassified); BIOL (Biological study); USES (Uses)
IT (comprising **amylase** catalytic and carbohydrate-binding domains; processes for producing fermentation product, such as ethanol, from milled starch without **gelatinization** using **glucoamylase** from Athelia rolfsii and acid α -**amylase**)
IT Carbohydrates, biological studies
IT RL: BSU (Biological study, unclassified); BIOL (Biological study) (concentration kept below 3 weight %; processes for producing fermentation product, such as ethanol, from milled starch without **gelatinization** using **glucoamylase** from Athelia rolfsii and acid α -**amylase**)
IT Milling (size reduction)

(dry or wet; processes for producing fermentation product, such as ethanol, from milled starch without *gelatinization* using *glucoamylase* from *Athelia rolfsii* and acid α -*amylase*)

IT *Athelia rolfsii*
(*glucoamylase* from; processes for producing fermentation product, such as ethanol, from milled starch without *gelatinization* using *glucoamylase* from *Athelia rolfsii* and acid α -*amylase*)

IT Peptides, biological studies
RL: BUI (Biological use, unclassified); BIOL (Biological study); USES
(linker, hybrid enzyme comprising; processes for producing fermentation product, such as ethanol, from milled starch without *gelatinization* using *glucoamylase* from *Athelia rolfsii* and acid α -*amylase*)

IT Saccharification
(milled starch; processes for producing fermentation product, such as ethanol, from milled starch without *gelatinization* using *glucoamylase* from *Athelia rolfsii* and acid α -*amylase*)

IT Protein sequences
(of *glucoamylase* from *Athelia rolfsii*, and *Aspergillus* α -*amylases*; processes for producing fermentation product, such as ethanol, from milled starch without *gelatinization* using *glucoamylase* from *Athelia rolfsii* and acid α -*amylase*)

IT DNA sequences
(of *glucoamylase* gene from *Athelia rolfsii*; processes for producing fermentation product, such as ethanol, from milled starch without *gelatinization* using *glucoamylase* from *Athelia rolfsii* and acid α -*amylase*)

IT Acidity
(pH 4-5; processes for producing fermentation product, such as ethanol, from milled starch without *gelatinization* using *glucoamylase* from *Athelia rolfsii* and acid α -*amylase*)

IT Fermentation
(processes for producing fermentation product, such as ethanol, from milled starch without *gelatinization* using *glucoamylase* from *Athelia rolfsii* and acid α -*amylase*)

IT Alcohols, preparation
RL: BPN (Biosynthetic preparation); BIOL (Biological study); PREP
(processes for producing fermentation product, such as ethanol, from milled starch without *gelatinization* using *glucoamylase* from *Athelia rolfsii* and acid α -*amylase*)

IT Fuels
(production; processes for producing fermentation product, such as ethanol, from milled starch without *gelatinization* using *glucoamylase* from *Athelia rolfsii* and acid α -*amylase*)

IT Enzymes, biological studies
RL: BUI (Biological use, unclassified); BIOL (Biological study); USES
(saccharifying, use of; processes for producing fermentation product, such as ethanol, from milled starch without *gelatinization* using *glucoamylase* from *Athelia rolfsii* and acid α -*amylase*)

IT Mutagenesis
(site-directed, deletion, in bacterial α -

amylases; processes for producing fermentation product, such as ethanol, from milled starch without *gelatinization* using *glucoamylase* from *Athelia rolfsii* and acid α -*amylase*)

IT Mutagenesis
(site-directed, substitution, in bacterial α -*amylases*; processes for producing fermentation product, such as ethanol, from milled starch without *gelatinization* using *glucoamylase* from *Athelia rolfsii* and acid α -*amylase*)

IT Cereal (grain)
Fruit
Hordeum vulgare
Manihot esculenta
Oryza sativa
Root
Sago palm
Secale cereale
Seed
Solanum tuberosum
Sorghum bicolor
Stem
Triticum aestivum
Tuber (plant organ)
Zea mays
(starch from; processes for producing fermentation product, such as ethanol, from milled starch without *gelatinization* using *glucoamylase* from *Athelia rolfsii* and acid α -*amylase*)

IT Organelle
(starch granule, fermentation product from; processes for producing fermentation product, such as ethanol, from milled starch without *gelatinization* using *glucoamylase* from *Athelia rolfsii* and acid α -*amylase*)

IT Sorghum
(subglabrescens group, starch from; processes for producing fermentation product, such as ethanol, from milled starch without *gelatinization* using *glucoamylase* from *Athelia rolfsii* and acid α -*amylase*)

IT Enzyme functional sites
(substrate-binding, carbohydrate-binding, hybrid *amylase* comprising; processes for producing fermentation product, such as ethanol, from milled starch without *gelatinization* using *glucoamylase* from *Athelia rolfsii* and acid α -*amylase*)

IT Fungi
(α -*amylase* and acid protease from; processes for producing fermentation product, such as ethanol, from milled starch without *gelatinization* using *glucoamylase* from *Athelia rolfsii* and acid α -*amylase*)

IT *Aspergillus kawachii*
(α -*amylase* domains from; processes for producing fermentation product, such as ethanol, from milled starch without *gelatinization* using *glucoamylase* from *Athelia rolfsii* and acid α -*amylase*)

IT *Aspergillus niger*
(α -*amylase* from, *glucoamylase* domains from; processes for producing fermentation product, such as ethanol, from milled starch without *gelatinization* using *glucoamylase* from *Athelia rolfsii* and acid α -*amylase*)

IT *Aspergillus awamori*
Aspergillus oryzae

Bacillus amyloliquefaciens
Bacillus licheniformis
Geobacillus stearothermophilus
(α -amylase from, processes for producing fermentation product, such as ethanol, from milled starch without *gelatinization* using *glucoamylase* from *Athelia rolfsii* and acid α -amylase)

IT 9005-25-8. Starch, biological studies
RL: BSU (Biological study, unclassified); BIOL (Biological study)
(-containing material, fermentation product from, processes for producing fermentation product, such as ethanol, from milled starch without *gelatinization* using *glucoamylase* from *Athelia rolfsii* and acid α -amylase)

IT 9000-90-2
RL: BUU (Biological use, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)
(acid, addition of, processes for producing fermentation product, such as ethanol, from milled starch without *gelatinization* using *glucoamylase* from *Athelia rolfsii* and acid α -amylase)

IT 861911-09-3 861911-10-6 861911-11-7, Amylase, α - (Aspergillus niger) 861911-12-8D, Amylase, α - (Bacillus licheniformis), fragments, mutants, and fusion products 861911-13-9D, Amylase, α - (Bacillus amyloliquefaciens), fragments, mutants, and fusion products 861911-14-0D, mutated variants
RL: BUU (Biological use, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)
(amino acid sequence; processes for producing fermentation product, such as ethanol, from milled starch without *gelatinization* using *glucoamylase* from *Athelia rolfsii* and acid α -amylase)

IT 861911-08-2
RL: BUU (Biological use, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)
(nucleotide sequence; processes for producing fermentation product, such as ethanol, from milled starch without *gelatinization* using *glucoamylase* from *Athelia rolfsii* and acid α -amylase)

IT 64-17-5P, Ethanol, preparation
RL: BPN (Biosynthetic preparation); NUU (Other use, unclassified); BIOL (Biological study); PREP (Preparation); USES (Uses)
(potable, industrial, or fuel; processes for producing fermentation product, such as ethanol, from milled starch without *gelatinization* using *glucoamylase* from *Athelia rolfsii* and acid α -amylase)

IT 199239-08-2, GenBank AB008370
RL: BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study)
(processes for producing fermentation product, such as ethanol, from milled starch without *gelatinization* using *glucoamylase* from *Athelia rolfsii* and acid α -amylase)

IT 7732-18-5, Water, biological studies
RL: BUU (Biological use, unclassified); BIOL (Biological study); USES (Uses)
(processes for producing fermentation product, such as ethanol, from milled starch without *gelatinization* using *glucoamylase* from *Athelia rolfsii* and acid α -amylase)

IT 9000-90-2D, functional fragments, mutants, and fusion products
9032-08-0, *glucoamylase*
RL: BUU (Biological use, unclassified); PRP (Properties); BIOL (Biological study); USES (Uses)
(processes for producing fermentation product, such as ethanol, from milled starch without *gelatinization* using *glucoamylase* from *Athelia rolfsii* and acid α -amylase)

starch without *gelatinization* using *glucoamylase* from *Athelia rolfsii* and acid α -amylase)

IT 9001-92-7, Proteinase
RL: BUU (Biological use, unclassified); BIOL (Biological study); USES (Uses)
(protease, preferably fungal acid protease; processes for producing fermentation product, such as ethanol, from milled starch without *gelatinization* using *glucoamylase* from *Athelia rolfsii* and acid α -amylase)

IT 861915-11-9 861915-31-3 861915-33-5 861915-35-7 861915-37-9
RL: PRP (Properties)
(unclaimed nucleotide sequence; processes for producing a fermentation product, such as ethanol, from milled starch without *gelatinization* using *glucoamylase* from *Athelia rolfsii* and acid α -amylase)

IT 861915-12-0 861915-13-1 861915-14-2 861915-15-3 861915-16-4
861915-17-5 861915-18-6 861915-19-7 861915-20-0 861915-21-1
861915-22-2 861915-23-3 861915-24-4 861915-25-5 861915-26-6
861915-27-7 861915-28-8 861915-29-9 861915-30-2 861915-32-4
861915-34-6 861915-36-8 861915-38-0 861915-40-4
RL: PRP (Properties)
(unclaimed protein sequence; processes for producing a fermentation product, such as ethanol, from milled starch without *gelatinization* using *glucoamylase* from *Athelia rolfsii* and acid α -amylase)

IT 824951-61-3 824951-62-4 824951-63-5 824951-64-6
RL: PRP (Properties)
(unclaimed sequence; processes for producing a fermentation product, such as ethanol, from milled starch without *gelatinization* using *glucoamylase* from *Athelia rolfsii* and acid α -amylase)

L12 ANSWER 5 OF 69 HCAPLUS COPYRIGHT 2007 ACS on STN
ACCESSION NUMBER: 2005:493688 HCAPLUS
DOCUMENT NUMBER: 143:42784
TITLE: Expression of granular starch-hydrolyzing *glucoamylase* from filamentous fungi in *Trichoderma* for producing glucose syrup from granular starch substrates
INVENTOR(S): Baldwin, Toby L.; Bower, Benjamin S.; Chotani, Gopal K.; Dunn-Coleman, Nigel; Lantero, Oreste, Jr.; Lantz, Suzanne E.; Pepsin, Michael J.; Shetty, Jayarama K.; Strohm, Bruce A.; Wang, Huang
PATENT ASSIGNEE(S): Genencor International, Inc., USA
SOURCE: PCT Int. Appl., 88 pp.
CODEN: PIXD2
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2005052148	A2	20050609	WO 2004-US38713	20041118
WO 2005052148	A3	20050915		
W:	AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GE, GH, GM, GR, GU, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NA, NI, NL, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TN, TR, TT, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW			
RW:	BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AZ, BY, BG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LU, MC, NL, PL, PT, RO,			

SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, CA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

AU 2004293789 A1 20050609 AU 2004-293789 20041118
 CA 2546659 A1 20050609 CA 2004-2546659 20041118
 US 2005136525 A1 20050623 US 2004-991654 20041118
 US 2005208623 A1 20050922 US 2004-992187 20041118
 EP 1685244 A2 20060802 EP 2004-811428 20041118
 R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, FI, RO, CY, TR, BG, CZ, EE, HU, PL, SK, IS
 EP 1698692 A2 20060906 EP 2006-9350 20041118
 EP 1698692 A3 20070103
 R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, PL, SK, HR, IS, YU

CN 1875099 A 20061206 CN 2004-80012375 20041118
 BR 2004016762 A 20070227 BR 2004-16762 20041118
 JP 2007512813 T 20070524 JP 2006-541373 20041118
 MX 2006PA05530 A 20060817 MX 2006-PA5530 20060516
 US 200709272 A1 20070503 US 2006-633309 20061204
 P 20031121
 P 20031222
 P 20031953P
 P 20040428
 A3 20041118
 A1 20041118
 W 20041118
 WO 2004-US38713

PRIORITY APPLN. INFO.:
 AB The present invention relates to filamentous fungal host cells and particularly Trichoderma host cells useful for the production of heterologous granular starch hydrolyzing enzymes having *glucoamylase* activity (GSHE). Further the invention relates to a method for producing a glucose syrup comprising contacting a granular starch slurry obtained from a *amylose* and a GSHE at a temperature equal to or below the gelatinization temperature of the granular starch to obtain a composition of thermolabile GSHE gene or Aspergillus awamori kawachi GSHE gene in Trichoderma reesei is reported. Solubilization and hydrolysis of granular cornstarch by the recombinant GSHE is described.

L12 ANSWER 6 OF 69 HCAPLUS COPYRIGHT 2007 ACS on STN
 ACCESSION NUMBER: 2005:521833 HCAPLUS
 DOCUMENT NUMBER: 143:25617
 TITLE: Powdered koji-making method, potato-based koji, and beverages manufactured using the powdered koji
 INVENTOR(S): Ago, Shoji; Taketani, Akira
 PATENT ASSIGNEE(S): Asahi Breweries, Ltd., Japan
 SOURCE: Jpn. Kokai Tokkyo Koho, 16 pp.
 CODEN: JKXAF
 DOCUMENT TYPE: Patent
 LANGUAGE: Japanese
 FAMILY ACC. NUM. COUNT: 1
 PATENT INFORMATION:
 PATENT NO. KIND DATE APPLICATION NO. DATE
 JP 2005151813 A 20050616 JP 2003-390957 20031120
 JP 2003-390957 20031120
 PRIORITY APPLN. INFO.:
 AB The koji-making method involves adding water to starch powder and/or powders comprising potato and/or cereal, mech. mixing the powders with the water, *gelatinizing* the resulting water-dispersed powders, and culturing koji mold with the water-dispersed powders. Beverages, e.g., shochu, are manufactured using the powdered koji. The activities of *glucoamylase*, *alpha-amylose*, and β -glucosidase in sweet potato koji prepared by the method were higher than those in conventional rice koji.

L12 ANSWER 7 OF 69 HCAPLUS COPYRIGHT 2007 ACS on STN
 ACCESSION NUMBER: 2004:246958 HCAPLUS
 DOCUMENT NUMBER: 140:269985
 TITLE: Method for preparing a rice milk by enzymic saccharification
 INVENTOR(S): Ravagnani, Vinicio; Sambataro, Diego
 PATENT ASSIGNEE(S): Abafoods S.r.l., Italy
 SOURCE: Eur. Pat. Appl., 10 pp.
 CODEN: EPXKDW

DOCUMENT TYPE: Patent
 LANGUAGE: English
 FAMILY ACC. NUM. COUNT: 1
 PATENT INFORMATION:
 PATENT NO. KIND DATE APPLICATION NO. DATE
 EP 1400177 A1 20040324 EP 2003-19603 20030904
 R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK
 CN 1659487 A 20050921 CN 2004-10063970 20040319
 IT 2002-M0257 A 20020919
 PRIORITY APPLN. INFO.:
 REFERENCE COUNT: 11 THERE ARE 11 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT
 AB A method for preparing a rice-based beverage comprises mixing rice with water to enable saccharification (e.g., with non-thermostable enzymes) to a glucose-containing product and stabilization of the product by continuously extracting the portions which have greater mol. weight. Thus, starch is *gelatinized* at 95° to enable subsequent saccharification with a bacterial *alpha-amylose* (at 70-85°), followed by use of a second saccharifying enzyme (*glucoamylase* at 60-70°), insol. residues (fiber and protein) being removed by centrifugation.

L12 ANSWER 8 OF 69 HCAPLUS COPYRIGHT 2007 ACS on STN
 ACCESSION NUMBER: 2004:683799 HCAPLUS
 DOCUMENT NUMBER: 141:394149
 TITLE: Production of α -amylase and glucoamylase by a new isolate of Trichoderma sp. using sorghum starch as a carbon source
 AUTHOR(S): Pacheco-Chavez, R. A.; Carvalho, J. C. M.; Tavares, L. C.; Penna, T. C. Vessoni; Converti, A.; Sato, S.
 CORPORATE SOURCE: Department of Chemical and Process Engineering, Genoa University, Genoa, 16145, Italy
 SOURCE: Engineering in Life Sciences (2004), 4(4), 369-372
 CODEN: ELSNAE; ISSN: 1618-0240
 PUBLISHER: Wiley-VCH Verlag GmbH & Co. KGaA
 DOCUMENT TYPE: Journal
 LANGUAGE: English
 REFERENCE COUNT: 30 THERE ARE 30 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT
 AB The aim of this work is to evaluate the performance of a new Trichoderma sp. isolate to produce extracellular *alpha-amylose* and *glucoamylase* from raw sorghum starch. To reduce the costs of starch saccharification and the consumption of amylolytic enzymes, this microorganism has been used for the first time in incubations using such a carbon source without any prior *gelatinization*. Incubation of this microorganism at 28 °C, 180 rpm and starting pH 5.3 ensured *alpha-amylose* and *glucoamylase* activities of 258 \pm 2.8 and 83 \pm 1.2 U/L after 24 and 120 h, resp., and maximum productivities of 11 \pm 0.9 and 2.3 \pm 0.2 U/L h, after 24 h. In general, *alpha-amylose* was produced 4-5 times more quickly than *glucoamylase* and no less than 78 % of starting sorghum starch was hydrolyzed, releasing 49 \pm 7 mg/L total reducing sugars and

28±3 mg/L glucose. It is the first time that an isolate of the Trichoderma genus was found to express such amylolytic activities using raw sorghum starch. The ability of this microorganism to overproduce amylases could be usefully exploited for direct saccharification of other raw starches using different nitrogen sources.

L12 ANSWER 9 OF 69 HCAPLUS COPYRIGHT 2007 ACS on STN
ACCESSION NUMBER: 2004:638143 HCAPLUS
DOCUMENT NUMBER: 141:348864
TITLE: Production of α -amylase and glucoamylase from different starches by a new Trichoderma sp. isolate
AUTHOR(S): Chavez, R. A. Pacheco; Carvalho, J. C. M.; Converti, A.; Perego, P.; Tavares, L. C.; Sato, Sunao
CORPORATE SOURCE: Department of Biochemical and Pharmaceutical Technology, University of Sao Paulo, Sao Paulo, 05508-900, Brazil
SOURCE: Annals of Microbiology (Milano, Italy) (2004), 54(2), 169-180
CODEN: AMIC7; ISSN: 1590-4261
PUBLISHER: University of Milan, Dep of Food Science and Microbiology
DOCUMENT TYPE: Journal
LANGUAGE: English
REFERENCE COUNT: 49

AB Different carbon sources were tested for the simultaneous cultivation and production of extracellular α -amylase and glucoamylase by a new Trichoderma sp. isolate, namely sorghum, soluble (potato), corn, and cassava starches as well as maltose. Although maltose behaved better than the other carbon sources in terms of α -amylase activity (about 28,000 U/L) and much higher glucoamylase activities (17,000-18,000 U/L) and productivities (about 390 U/L-h), cassava and corn starches ensured productivities close to that obtained with maltose (about 100 U/L-h). Because of its ability to produce either α -amylase or glucoamylase, the Trichoderma isolate used in this study promises to be advantageously used in a direct process for raw starch saccharification without preliminary gelatinization

L12 ANSWER 10 OF 69 HCAPLUS COPYRIGHT 2007 ACS on STN
ACCESSION NUMBER: 2003:656930 HCAPLUS
DOCUMENT NUMBER: 139:196392
TITLE: Use of cyclodextrin glycosyltransferase, glucoamylase and α -amylase for generating soluble starch hydrolysates for synthesis of high fructose starch-based syrups, fuel and potable ethanol
INVENTOR(S): Norman, Barrie Edmund; Vikso-Nielsen, Anders; Olsen, Hans Sejr; Pedersen, Sven
PATENT ASSIGNEE(S): Novozymes A/S, Den.
SOURCE: PCT Int. Appl., 40 pp.
CODEN: PIXD2

DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:
PATENT NO. KIND DATE APPLICATION NO. DATE
WO 2003068976 A2 20030821 WO 2003-DK84 20030210
WO 2003068976 A3 20031224
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, IL, IN, IS, JP, KE, KR, KZ, LC, LK, LR,

LS, LT, LU, LV, MA, MD, MG, MK, MN, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, AM, AZ, BY, BG, CA, CC, CD, CF, CI, CM, CG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, GU, IE, IT, LU, MC, ML, MT, NE, NL, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW
CA 2474082 A1 20030821 CA 2003-2474082 20030210
AU 2003205556 A1 20030804 AU 2003-205556 20030210
EP 1476556 A2 20041117 EP 2003-702374 20030210
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, PL, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK
US 2005107332 A1 20050519 US 2003-504543 20030210
CN 1633503 A 20050629 CN 2003-803986 20030210
MX 2004PA07811 A 20041015 MX 2004-PA7811 20040812
PRIORITY APPLN. INFO.: DK 2002-227 A 20020214
WO 2003-DK84 W 20030210

AB The present invention relates to a process for enzymic hydrolysis of granular starch into a soluble starch hydrolyzate at a temperature below the initial gelatinization temperature of said granular starch. In particular, it relates to the use of cyclodextrin glycosyltransferase, glucoamylase, acid fungal α -amylase and α -amylase and hydrolysates for generating soluble starch hydrolysates for synthesis of high fructose starch-based syrups, fuel and potable ethanol.

L12 ANSWER 11 OF 69 HCAPLUS COPYRIGHT 2007 ACS on STN
ACCESSION NUMBER: 2004:199895 HCAPLUS
DOCUMENT NUMBER: 140:405875
TITLE: Effect of starch degradation enzymes on the retrogradation of Korean rice cakes
AUTHOR(S): Song, Jae-Chul; Park, Hyun-Jeong
CORPORATE SOURCE: College of Human Ecology, University of Ulsan, Ulsan, 680-749, S. Korea
SOURCE: Han'guk Sikk'um Yongyang Kwahak Hoechi (2003), 32(8), 1262-1269
CODEN: HSYHFB; ISSN: 1226-3311

PUBLISHER: Korean Society of Food Science and Nutrition
DOCUMENT TYPE: Journal
LANGUAGE: Korean
AB In this study, enzymes were investigated as an antistaling agent for a Korean rice cake. Thermograms by a DSC demonstrated that the gelatinization-onset temperature of the Korean rice cake was at its lowest temperature of 71.1° with the GP (glucoamylase + pullulanase) treatment, followed by β -amylase and α -amylase. The gelatinization peak temperature of the Korean rice cake with enzyme treatment was relatively lower compared to the control. Furthermore, the Korean rice cake with GP treatment showed the lowest peak temperature. Melting enthalpy of the Korean rice cake increased

with the enzyme treatment, with α -amylase, followed by β -amylase and GP. Melting enthalpy of the Korean rice cake with GP treatment was significantly lower compared to the β - and α -amylase treatment. Recrystallinity in the case of GP treatment was also significantly lower than control. The range of Avrami exponent (n) was 0.90-1.20 and the time constant of retrogradation (1/k) of the Korean rice cake crystalline decreased in the following order: GP, β -, α -amylase and control. Textural characteristics of the Korean rice cake with enzyme treatment differed greatly from that of control. The Δ^* values of all the Korean rice cakes made without β -amylase decreased and the Δ^* values were significantly different at $p < 0.05$. The GP treatment altered the Δ^* value toward blue color, whereas β - and α -amylase.

- amylase** changed to the direction to yellow color. In sensory evaluation, the Korean rice cake with enzyme treatment showed higher evaluation compared to control.
- L12 ANSWER 12 OF 69 HCAPLUS COPYRIGHT 2007 ACS on STN
 ACCESSION NUMBER: 2003:978809 HCAPLUS
 DOCUMENT NUMBER: 140:234697
 TITLE: Amylolytic activity and properties of starch granules from the giant embryonic rice
 AUTHOR(S): Kang, Mi-Young; Lee, Yun-Ri; Nam, Seok Hyun
 CORPORATE SOURCE: Department of Food Science and Nutrition, Kyungpook National University, Taegu, 702-701, S. Korea
 SOURCE: Han'guk Nongwa Hakhoechi (2003), 46(3), 189-194
 CODEN: JKAC47; ISSN: 0368-2897
 PUBLISHER: Korean Society of Agricultural Chemistry and Biotechnology
 DOCUMENT TYPE: Journal
 LANGUAGE: Korean
 AB Rice seeds of 4 cultivars including Whachung-giant embryonic rice and Nampung giant embryonic rice, as a group of the non-waxy rice cultivars, and Shinsunchal-giant embryonic rice and Whachungchal-giant embryonic rice, as that of the waxy rice cultivars, were germinated at 27° for 3 days to compare the changes in some physicochem. properties of the starch granules and the starch-hydrolyzing enzyme activities during germination, resp. **alpha-Amylase** activity of rice germinated for 3 days was higher than that of malt. Especially, Whachung-giant embryonic rice and Shinsunchal-giant embryonic rice were greater in activity than other rice cultivars and possessed the activities double that of malt. In contrast, β -amylase of germinated rice was considerably less active than malt, although the giant embryonic rice group showed prevalent activity as compared to the normal rice group. With the starch granules, the amount of long glucose chains from amylose mols. were reduced in the non-waxy type giant embryonic rice, while the chain length increase was found in the waxy type giant embryonic rice. For the distribution profile of the glucose chain length from amylopectin mols., it was observed that the chain length with DP ranged 33 to 66 and 14 to 32 increased with the decreasing rate of that above 67 and below 13 regardless of starch waxiness. With non-waxy type of giant embryonic rice, susceptibility for **glucoamylase** were found to reduce along with germination, however, increase in susceptibility was observed with waxy rice types. In addition, the authors found the reduction in both initiation and termination temperature, and enthalpy for **gelatinization**.
- L12 ANSWER 13 OF 69 HCAPLUS COPYRIGHT 2007 ACS on STN
 ACCESSION NUMBER: 2003:775622 HCAPLUS
 DOCUMENT NUMBER: 139:380246
 TITLE: Examination of degrading enzymes in measurement of gelatinization degree
 AUTHOR(S): Ikeda, Hideki; Gunji, Masayuki; Takayama, Yoshinori; Tomita, Kenji
 CORPORATE SOURCE: Yokohama Customs Laboratory, Yokohama, 231-8401, Japan
 SOURCE: Kanzei Chuo Bunsekisho (2002), 42, 41-47
 CODEN: KCBSDI; ISSN: 0286-1933
 PUBLISHER: Zaimusho Kanzei Chuo Bunsekisho
 DOCUMENT TYPE: Journal
 LANGUAGE: Japanese
 IT 9000-90-2, **α -Amylase**
 RL: ARG (Analytical reagent use); BSU (Biological study, unclassified); ANST (Analytical study); BIOL (Biological study); USES (Uses) (co-use with **glucoamylase**; examination of degrading enzymes in measurement of **gelatinization** degree)
- IT 9032-08-0, **Glucoamylase**
 RL: ARG (Analytical reagent use); BSU (Biological study, unclassified);
- ANST (Analytical study); BIOL (Biological study); USES (Uses) (co-use with **α -amylase**; examination of degrading enzymes in measurement of **gelatinization** degree)
- L12 ANSWER 14 OF 69 HCAPLUS COPYRIGHT 2007 ACS on STN
 ACCESSION NUMBER: 2001:889074 HCAPLUS
 DOCUMENT NUMBER: 136:199277
 TITLE: Physicochemical properties of starches from flavored glutinous rice varieties
 AUTHOR(S): Choi, Young-Hee; Kim, Kwang-Ho; Kang, Mi-Young
 CORPORATE SOURCE: Dept. of Food Science and Nutrition, Kyungpook National University, Taegu, 702-701, S. Korea
 SOURCE: Han'guk Sikip'um Yongyang Kwahak Hoechi (2001), 30(5), 765-769
 CODEN: HSYHFB; ISSN: 1226-3311
 PUBLISHER: Korean Society of Food Science and Nutrition
 DOCUMENT TYPE: Journal
 LANGUAGE: Korean
 AB Starches of flavored glutinous rice were analyzed by using SEM and differential scanning calorimetry (DSC) and starch granule susceptibility to hydrolysis was tested using 1% H2SO4, **glucoamylase** and **alpha-amylase**. Shape of starch granules from flavored glutinous rice varieties was polygonal and the size was 4-6 μ m in diameter. According to DSC, glutinous rice starch showed the onset temperature (To) range of 59.8 approx. 62.5° and KR92021-B-B-42-3-B and KR92021-B-B-165-1-B showed higher enthalpy (Δ H) on **gelatinization** than others. Starches from KR92021-B-B-5-2-B and KR92021-B-B-42-3-B showed lower hydrolysis rate by 15% H2SO4 than KR92021-B-B-165-1-B. KR92021-B-B-5-2-B showed higher degree of hydrolysis by **glucoamylase** and **alpha-amylase** than the others.
- L12 ANSWER 15 OF 69 BIOSIS COPYRIGHT (c) 2007 The Thomson Corporation on STN
 ACCESSION NUMBER: 2001:463175 BIOSIS
 DOCUMENT NUMBER: PREV200100463175
 TITLE: Anaerobic fermentation of gelatinized sago starch-derived sugars to acetone-1-butanol-ethanol solvent by Clostridium acetobutylicum.
 AUTHOR(S): Madhah, M. S.; Ariff, A. B. [Reprint author]; Khalil, M. S.; Suraini, A. A.; Karim, M. I. A.
 CORPORATE SOURCE: Department of Biotechnology, Faculty of Food Science and Biotechnology, Universiti Putra Malaysia, 43400, Serdang, Selangor, Malaysia
 SOURCE: arbarif@fb.upm.edu.my
 CODEN: FOMIAZ; ISSN: 0015-5632.
 DOCUMENT TYPE: Article
 LANGUAGE: English
 ENTRY DATE: Last Updated on STN: 23 Feb 2002
 AB. . . and their mixture derived from enzymic hydrolysis of sago starch by Clostridium acetobutylicum showed that the use of 30 g/L **gelatinized** sago starch as the sole carbon source produced 11.2 g/L total solvent, i.e. 1.5-2 times more than with pure maltose or glucose used as carbon sources. Enzymic pretreatment of **gelatinized** sago starch yielding maltose and glucose hydrolyzates prior to the fermentation did not improve solvent production as compared to direct fermentation of **gelatinized** sago starch. The solvent yield of direct **gelatinized** sago starch fermentation depended on the activity and stability of amylolytic enzymes produced during the fermentation. The pH optima for **alpha-amylase** and **glucoamylase** were found to be at 5.3 and 4.0-4.4, respectively. **alpha-Amylase** showed a broad pH stability profile,

retaining more than 80% of its maximum activity at pH 3.0-8.0 after a 1-d incubation at 37 degreeC. Since *C. acetobutylicum* **alpha-amylase** has a high activity and stability at low pH, this strain can potentially be employed in a one-step direct solvent-yielding fermentation of sago starch. However, the *C. acetobutylicum* **glucoamylase** was only stable at pH 4-5, maintaining more than 90% of its maximum activity after a 1-d incubation at 37.

L12 ANSWER 16 OF 69 BIOSIS COPYRIGHT (c) 2007 The Thomson Corporation on STN
 ACCESSION NUMBER: 2000:204816 BIOSIS
 DOCUMENT NUMBER: PREV200000204816
 TITLE: Enzymatic treatment of rice bran to improve processing.
 AUTHOR(S): Hernandez, N.; Rodriguez-Alegria, M. E.; Gonzalez, F.; Lopez-Munigua, A. [Reprint author]
 CORPORATE SOURCE: Instituto de Biotecnologia, UNAM, Cuernavaca, MOR, 62271, Mexico
 SOURCE: Journal of the American Oil Chemists' Society, (Feb., 2000) Vol. 77, No. 2, pp. 177-180. print.
 CODEN: JAOCA7. ISSN: 0003-021X.

DOCUMENT TYPE: Article
 LANGUAGE: English
 ENTRY DATE: Entered STN: 24 May 2000
 Last Updated on STN: 5 Jan 2002
 AB. . . to solvent extraction or pressing. A thermal treatment of rice bran is first applied to deactivate lipase, but also to **gelatinize** starch previous to reaction with **alpha-amylase**. This is followed by a saccharifying step with **glucoamylase** to produce glucose (28 g/100 g of rice bran treated), while the residual paste, 66.7% of the original bran, may. . . the defined extraction conditions using hexane, yields of oil are 5% higher when rice bran has been previously treated with **alpha-amylase**.

L12 ANSWER 17 OF 69 SCISEARCH COPYRIGHT (c) 2007 The Thomson Corporation on STN
 ACCESSION NUMBER: 2000:568167 SCISEARCH
 THE GENUINE ARTICLE: 334RW
 TITLE: Degradation of starchy food material by thermal analysis
 AUTHOR: Aggarwal P (Reprint); Dollimore D
 CORPORATE SOURCE: Univ Toledo, Dept Chem, Toledo, OH 43606 USA (Reprint)
 COUNTRY OF AUTHOR: USA
 SOURCE: THERMOCHEMICA ACTA, (14 AUG 2000) Vol. 357, pp. 57-63.
 ISSN: 0040-6031.
 PUBLISHER: ELSEVIER SCIENCE BV, PO BOX 211, 1000 AE AMSTERDAM, NETHERLANDS.
 DOCUMENT TYPE: Article; Journal
 LANGUAGE: English
 REFERENCE COUNT: 24
 ENTRY DATE: Entered STN: 2000
 Last Updated on STN: 2000

ABSTRACT IS AVAILABLE IN THE ALL AND IALL FORMATS
 STP Keywords Plus (R): **ALPHA-AMYLASE**; A-TYPE;
GELATINIZATION; **GLUCOAMYLASE**; MICROSCOPY; HYDROLYSIS;
 BACTERIAL; GRANULES

L12 ANSWER 18 OF 69 BIOSIS COPYRIGHT (c) 2007 The Thomson Corporation on STN
 ACCESSION NUMBER: 1999:227419 BIOSIS
 DOCUMENT NUMBER: PREV199900227419
 TITLE: Optimal preparation of saccharified rice solution for Bifidobacterium fermentation.
 AUTHOR(S): Lee, Ju-Yeon; Mok, Chulkyoon [Reprint author]; Park, Jong-Hyun; Chang, Hak-Gil; Koo, Dong-Joo
 CORPORATE SOURCE: Department of Food and Bioengineering, Kyungwon University,

San 65, Bokjung-dong Sujung-ku, Sunghnam, Kyunggi-do, 461-701, South Korea
 Hanguk Nongwhahak Hoechi, (Dec., 1998) Vol. 41, No. 7, pp. 527-532. print.
 CODEN: JKACA7. ISSN: 0368-2897.

DOCUMENT TYPE: Article
 LANGUAGE: Korean
 ENTRY DATE: Entered STN: 17 Jun 1999
 Last Updated on STN: 17 Jun 1999
 AB. . . Grinding for 30 seconds by an impact mill was more efficient than **gelatinization** showed a positive effect for efficient saccharification, and its optimal conditions were at 60degreeC for 45 min. The optimum **gelatinization** conditions were at 100degreeC for 40 min. The optimum levels of enzymes for saccharification of rice were 0.135 unit/g rice powder for **alpha-amylase** and 3.375 unit/g rice powder for **glucoamylase**, respectively. The physico-chemical properties of the fermented product by a fastidious Bifidobacterium showed a great potential for a functional rice. . .

L12 ANSWER 19 OF 69 BIOSIS COPYRIGHT (c) 2007 The Thomson Corporation on STN
 ACCESSION NUMBER: 1998:447011 BIOSIS
 DOCUMENT NUMBER: PREV199800447011
 TITLE: Kojic acid production by *Aspergillus flavus* using gelatinized and hydrolyzed sago starch as carbon sources.
 AUTHOR(S): Rosfarizan, M. [Reprint author]; Ariff, A. B.; Hassan, M. A.; Karim, M. I. A.
 CORPORATE SOURCE: Sep. Biotechnol., Univ. Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia
 SOURCE: Folia Microbiologica, (1998) Vol. 43, No. 5, pp. 459-464. print.
 CODEN: FOMIAZ. ISSN: 0015-5632.

DOCUMENT TYPE: Article
 LANGUAGE: English
 ENTRY DATE: Entered STN: 21 Oct 1998
 Last Updated on STN: 21 Oct 1998
 AB Direct conversion of **gelatinized** sago starch into kojic acid by *Aspergillus flavus* strain having amylolytic enzymes was carried out at two different scales of. . . starch as carbon sources. During kojic acid fermentation of starch, starch was first hydrolyzed to glucose by the action of **alpha-amylase** and **glucoamylase** during active growth phase. The glucose remaining during the production phase (non-growing phase) was then converted to kojic acid. Kojic. . .

L12 ANSWER 20 OF 69 BIOSIS COPYRIGHT (c) 2007 The Thomson Corporation on STN
 ACCESSION NUMBER: 1998:486371 BIOSIS
 DOCUMENT NUMBER: PREV199800486371
 TITLE: Comparative study of hydrolysis of various starches by **alpha-amylase** and **glucoamylase** in PEG-dextran and PEG-substrate aqueous two phase systems.
 AUTHOR(S): Karakatsani, A.; Liakopoulou-Kyriakides, M.
 CORPORATE SOURCE: Aristotle Univ. Thessaloniki, Dep. Chem. Eng., Sect. Chem., 54006 Thessaloniki, Greece
 SOURCE: Starch, (Aug., 1998) Vol. 50, No. 8, pp. 349-353. print.
 CODEN: STARDD. ISSN: 0038-9056.

DOCUMENT TYPE: Article
 LANGUAGE: English
 ENTRY DATE: Entered STN: 5 Nov 1998
 Last Updated on STN: 5 Nov 1998
 AB Various crude starches were hydrolyzed by the synergistic action of **alpha-amylase** and **glucoamylase** in PEG-dextran and PEG-substrate aqueous two phase systems. The hydrolysis products were

determined, at different temperatures, by the chromatometric method. formation of two phases, is that the substitution of the dextran polymer decreases remarkably the cost of the reaction. Prior **gelatinization** of the starch used, gives higher yields of glucose than in the case of non **gelatinized** starch and the separation of the phases is satisfactory.

L12 ANSWER 21 OF 69 BIOSIS COPYRIGHT (c) 2007 The Thomson Corporation on STN
DUPLICATE 6

ACCESSION NUMBER: 1998:390578 BIOSIS
DOCUMENT NUMBER: PREV199800390578
TITLE: Large scale preparation of crystalline glucose from raw starch in corn flour.
AUTHOR(S): Arasaratnam, Vasanthy [Reprint author]; Sriharan, Kirubahary; Nithiyantharajah, Navaratnam; Balasubramaniam, Kandiah
CORPORATE SOURCE: Dep. Biochem., Fac. Med., Univ. Jaffna, Kokuvil, Sri Lanka
SOURCE: Starch, (June, 1998) Vol. 50, No. 6, pp. 264-266. Print.
CODEN: STARDP. ISSN: 0038-9056.

DOCUMENT TYPE: Article
LANGUAGE: English
ENTRY DATE: Entered STN: 10 Sep 1998
Last Updated on STN: 10 Sep 1998
AB. . . Further, purification costs energy and time. To avoid these, starch in corn flour was hydrolyzed by the synergistic action of **alpha-amylase** and **glucoamylase** while avoiding high temperature **gelatinization** and liquefaction processes. When 1600 g (16%, w/w suspension) and 4000 g (40%, w/w suspension) corn flour was hydrolyzed and. . .

L12 ANSWER 22 OF 69 BIOSIS COPYRIGHT (c) 2007 The Thomson Corporation on STN
DUPLICATE 7

ACCESSION NUMBER: 1998:226827 BIOSIS
DOCUMENT NUMBER: PREV199800226827
TITLE: Enzymic digestibility of reduced-pressurized, heat-moisture treated starch.
AUTHOR(S): Maruca, Isao; Kurahashi, Yoshiki; Takano, Ryo; Hayashi, Kaeko; Kudo, Ken-ichi; Hara, Saburo [Reprint author]
CORPORATE SOURCE: Dep. Chem. Mater. Technol., Fac. Eng. Design, Kyoto Inst. Technol., Matsugasaki, Sakyo-ku, Kyoto 606, Japan
SOURCE: Food Chemistry, (Jan.-Feb., 1998) Vol. 61, No. 1-2, pp. 163-165. Print.
CODEN: FOCHDJ. ISSN: 0308-8146.

DOCUMENT TYPE: Article
LANGUAGE: English
ENTRY DATE: Entered STN: 20 May 1998
Last Updated on STN: 20 May 1998
AB The digestibility of the reduced-pressurized heat-moisture treated corn starches by **alpha-amylase** and **glucoamylase** was studied. By the treatment, regular and waxy corn starch granules were well digested by **alpha-amylase** without **gelatinization**, while the digestibility of the high amylose corn starch was reduced. Both regular and waxy corn starches, regardless of the treatment, were digested well by enzymes under the **gelatinized** condition. However, a drastic increase of indigestible portion was observed in the high amylose corn starch. Methylation analysis of the.

L12 ANSWER 23 OF 69 BIOSIS COPYRIGHT (c) 2007 The Thomson Corporation on STN
DUPLICATE 8

ACCESSION NUMBER: 1998:4827 BIOSIS
DOCUMENT NUMBER: PREV19980004827
TITLE: Use of enzymes for the separation of protein from rice flour.

AUTHOR(S): Shih, Frederick F. [Reprint author]; Daigle, Kim
CORPORATE SOURCE: Southern Regional Research Center, PO Box 19687, New Orleans, LA 70179, USA
SOURCE: Cereal Chemistry, (July-Aug., 1997) Vol. 74, No. 4, pp. 437-441. Print.
CODEN: CECHAF. ISSN: 0009-0352.

DOCUMENT TYPE: Article
LANGUAGE: English
ENTRY DATE: Entered STN: 23 Dec 1997
Last Updated on STN: 23 Dec 1997
AB When rice flour was treated with heat stable **alpha-amylases**, the effectiveness of protein separation increased with increased temperature. Pending on the enzyme, treatment at 90degrec for 45 min resulted in protein contents of 47-65% for the insoluble fraction. Prior **gelatinization** enhanced the effectiveness of the enzyme reaction but was undesirable cause the increased viscosity and gelation could cause difficulties in the processing operation. Follow-up treatment with other carbohydrate-hydrolyzing enzymes, such as **glucoamylase** with cellulose, and hemicellulase further increased the protein content up to 76% for the insoluble fraction. The subunit structure of the.

L12 ANSWER 24 OF 69 SCISEARCH COPYRIGHT (c) 2007 The Thomson Corporation on STN

ACCESSION NUMBER: 1997:900108 SCISEARCH
THE GENUINE ARTICLE: VJ744
TITLE: Towards an understanding of starch granule structure and hydrolysis
AUTHOR: Oates C G (Reprint)
CORPORATE SOURCE: NATL UNIV SINGAPORE, DEPT BIOCHEM, 10 KENT RIDGE CRESCENT, SINGAPORE 119260, SINGAPORE (Reprint)
COUNTRY OF AUTHOR: SINGAPORE
SOURCE: TRENDS IN FOOD SCIENCE & TECHNOLOGY, (NOV 1997) Vol. 8, No. 11, pp. 375-382.
ISSN: 0924-2244.

PUBLISHER: ELSVIER SCIENCE LONDON, 84 THEOBALDS RD, LONDON WC1X 8RR, ENGLAND.
DOCUMENT TYPE: Article; Journal
LANGUAGE: English
REFERENCE COUNT: 50
ENTRY DATE: Entered STN: 1997
Last Updated on STN: 1997

ABSTRACT IS AVAILABLE IN THE ALL AND IALL FORMATS
STP Keywords plus (R): **ALPHA-AMYLASE**; POTATO STARCH; RAW-STARCH; AMYLOSE; DEGRADATION; **GELATINIZATION**; SUSCEPTIBILITY; CARBOHYDRATE; ORGANIZATION; **GLUCOAMYLASE**

L12 ANSWER 25 OF 69 HCAPLUS COPYRIGHT 2007 ACS on STN
ACCESSION NUMBER: 1998:20092 HCAPLUS
DOCUMENT NUMBER: 128:179580
TITLE: Effect of annealing on the hydrolysis of sago starch granules

AUTHOR(S): Wang, W. J.; Powell, A. D.; Oates, C. G.
CORPORATE SOURCE: Department of Biochemistry, National University of Singapore, Singapore, 0511, Singapore
SOURCE: Carbohydrate Polymers (1997), 33(2/3), 195-202
CODEN: CAPODS; ISSN: 0144-8617
PUBLISHER: Elsevier Science Ltd.
DOCUMENT TYPE: Journal
LANGUAGE: English

REFERENCE COUNT: 12
THERE ARE 12 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT
AB Sago starch annealed at varying temps., time intervals and pH was used to study granule hydrolysis by a **glucoamylase** (AMG) and **alpha-amylase** (Termamyl) mixture DSC indicated that

there was a relation between the extent of annealing and starch granule hydrolysis. The enthalpy of **gelatinization** of annealed starch granules remained unchanged, suggesting that no **gelatinization** had occurred. The degree of hydrolysis was increased and the granule degradation pattern was altered, from surface erosion to preferential digging of the internal regions of the granule. Sections of the hydrolyzed granule residues revealed that enzymes attacked from one point on sufficiently annealed granules, and that after extensive hydrolysis, only an empty shell remained.

L12 ANSWER 26 OF 69 BIOSIS COPYRIGHT (c) 2007 The Thomson Corporation on STN
 ACCESSION NUMBER: 1997:313782 BIOSIS
 DOCUMENT NUMBER: PREV199799604270
 TITLE: Hydrolysis of various starches by the synergistic action of alpha-amylase and glucoamylase in aqueous two phase impeller agitated systems.
 AUTHOR(S): Karakatsanis, A.; Liakopoulou-Kyriakides, M. [Reprint author]; Stamataoudis, M.
 CORPORATE SOURCE: Dep. Chemical Engineering, Section Chemistry, 54006 Thessaloniki, Greece
 SOURCE: Starch, (1997) Vol. 49, No. 5, pp. 194-199.
 CODEN: STARD. ISSN: 0038-9056.
 DOCUMENT TYPE: Article
 LANGUAGE: English
 ENTRY DATE: Entered STN: 26 Jul 1997
 Last Updated on STN: 26 Jul 1997

AB Various starches were hydrolyzed by the combination of **alpha-amylase** and **glucoamylase** in aqueous two phase impeller agitated systems. The reaction products were determined by the chromatometric method of phenol-sulfuric acid and by HPLC. The effect of temperature on glucose production was studied for these starches in **gelatinized** and non **gelatinized** form. It was found that crude corn starch (not in the **gelatinized** form) at 150 rpm and 40 degree C gives very good results in terms of glucose concentration.
 IT Miscellaneous Descriptors
 Chemical industry; **ALPHA-AMYLASE**, AQUEOUS PHASE
 IMPELLER AGITATED SYSTEMS; BIOSUSINESS; BIOPROCESS ENGINEERING;
GELATINIZED; **GLUCOAMYLASE**; GLUCOSE; HYDROLYSIS; NON-
GELATINIZED; PRODUCTION; STARCH

L12 ANSWER 27 OF 69 BIOSIS COPYRIGHT (c) 2007 The Thomson Corporation on STN
 ACCESSION NUMBER: 1996:186412 BIOSIS
 DOCUMENT NUMBER: PREV199698742541
 TITLE: Legume and cereal starches: Why differences in digestibility? Part II. Isolation and characterization of starches from rice (O. sativa) and ragi (finger millet, E. coracana).
 AUTHOR(S): Madhusudan, Basavaraj; Tharanathan, Rudrapatnam N. [Reprint author]
 CORPORATE SOURCE: Dep. Biochem. Nutr., Central Food Technological Res. Inst., Mysore-570 013, India
 SOURCE: Carbohydrate Polymers, (1995) Vol. 28, No. 2, pp. 153-158.
 CODEN: CAPD8. ISSN: 0144-8617.
 DOCUMENT TYPE: Article
 LANGUAGE: English
 ENTRY DATE: Entered STN: 29 Apr 1996
 Last Updated on STN: 29 Apr 1996

AB . . . viscosity increase was minimal. In vitro digestibility studies showed rice starch to be more digestible; in the native state, pancreatic **alpha-amylase** digested rice starch I to approx 60% and ragi starch I to approx 56%; whereas in the **gelatinized** state, **glucoamylase** digested the former to approx 88% and the latter to

apprx 70%.

L12 ANSWER 28 OF 69 HCAPLUS COPYRIGHT 2007 ACS on STN
 ACCESSION NUMBER: 1996:592 HCAPLUS
 DOCUMENT NUMBER: 124:149136
 TITLE: Study on the performance of solid-supported and soluble α -amylase and glucoamylase for the enzymic hydrolysis of modified starch

AUTHOR(S): Popa, Iuliana; Beldie, Camelia
 CORPORATE SOURCE: "Petru Poni" Institute Macromolecular Chemistry, Iasi, 6600, Rom.
 SOURCE: Progress in Catalysis (1995), 4(1), 39-46
 CODEN: POCTEU; ISSN: 1220-8698

PUBLISHER: Zecasin
 DOCUMENT TYPE: Journal
 LANGUAGE: English
 AB A study of enzymic modification of Na-Phosphate starch in different conditions was carried out. The **gelatinized** modified starch was subjected to activation with free and immobilized **alpha-amylase**. The kinetic and catalytic parameters of the maltodextrin hydrolysis process in the presence of both free and immobilized **glucoamylase** were evaluated. The influence of competition diffusion phenomena, which take place in the case of immobilized enzymes, was considered. Supports obtained at different degrees of crosslinking with glutaraldehyde were also used.

L12 ANSWER 29 OF 69 BIOSIS COPYRIGHT (c) 2007 The Thomson Corporation on STN
 ACCESSION NUMBER: 1995:6237 BIOSIS
 DOCUMENT NUMBER: PREV199598083537
 TITLE: Purification and properties of the raw starch digesting amylase from Penicillium brunneum Number 24.
 AUTHOR(S): Haska, Nadirman; Ohta, Yoshiyuki [Reprint author]
 CORPORATE SOURCE: Lab. Microbial Biochem., Fac. Applied Biol. Sci., Hiroshima Univ., 1-4-4 Kagamiyama, Higashi-Hiroshima 724, Hiroshima, Japan
 SOURCE: Starch, (1994) Vol. 46, No. 12, pp. 480-485.
 CODEN: STARD. ISSN: 0038-9056.

DOCUMENT TYPE: Article
 LANGUAGE: English
 ENTRY DATE: Entered STN: 8 Feb 1995
 Last Updated on STN: 14 Mar 1995
 AB . . . starch digesting amylase was obtained from Penicillium brunneum No. 24. The crude enzyme from this strain contains carboxymethylcellulase (CMC-ase), amylase, **alpha-amylase** and alpha-glucosidase. Affinity chromatography (alpha-cyclodextrin-Sepharose 6B) of the enzyme after ammonium sulfate fractionation, Toyopearl HW-55F gel filtration, DEAE-Sephadex A-50 and DEAE-cellulose chromatographies fractionation steps, resulted in a homogeneous **glucoamylase**. SDS-polyacrylamide gel electrophoresis of purified enzyme showed a single band, and a molecular weight of 80,000 for the native **glucoamylase** from Penicillium brunneum No. 24 was observed. After modification of the native **glucoamylase** with subtilisin, the molecular weight was reduced to 76,000. It lost the ability to digest and adsorb onto raw starches. However, its ability to digest **gelatinized** starches was preserved.

L12 ANSWER 30 OF 69 BIOSIS COPYRIGHT (c) 2007 The Thomson Corporation on STN
 ACCESSION NUMBER: 1993:387449 BIOSIS
 DOCUMENT NUMBER: PREV199396062749
 TITLE: Structure of tapioca pearls compared to starch noodles from mung beans.
 AUTHOR(S): Xu, Ansu [Reprint author]; Seib, Paul A.

CORPORATE SOURCE: Am. Maize-Prod. Co., Hammond, IN, USA
SOURCE: Cereal Chemistry, (1993) Vol. 70, No. 4, pp. 463-470.
CODEN: CEMAP. ISSN: 0009-0352.

DOCUMENT TYPE: Article
LANGUAGE: English
ENTRY DATE: Entered STN: 23 Aug 1993

AB Commercial tapioca pearls contain approximately 60% *gelatinized* starch, as determined by differential scanning calorimetry and *glucoamylase* digestibility. Exhaustive digestions showed that 2, 5, and 6% of cooked tapioca pearls were resistant to *alpha*-*amylase*, acid (1M HCl at 35 degree C), and to a combination of *isoamylase* and beta-*amylase*, respectively, whereas digestion of *isoamylase* and beta-*amylase*, respectively, whereas digestion of cooked. of resistant residues. All the resistant residues gave the B-polymorphic X-ray pattern typical of retrograded starch. At 75% moisture, the *alpha*-*amylase*-resistant residue did not melt below 147 degree C, whereas the acid-resistant residue melted at 128 degree C (T-p), and the *isoamylase* and beta-*amylase*-resistant residue melted at 92 degree C (T-p). Size-exclusion chromatography showed that the *alpha*-*amylase*-resistant residues contained unit chains with a peak at a number-average degree of polymerization (DP-n) of 33-37, and the acid-resistant residues.

L12 ANSWER 31 OF 69 HCAPLUS COPYRIGHT 2007 ACS ON STN
ACCESSION NUMBER: 1993:558571 HCAPLUS
DOCUMENT NUMBER: 119:158571
TITLE: Characteristic change of various starch granules by enzymatic treatment. I. Characteristic change of rice starch granules by enzymatic treatment
AUTHOR(S): Fukai, Yoichi; Takaki, Etsuko; Kobayashi, Shoichi
CORPORATE SOURCE: Agric. Technol. Inst. Nagano Farmers' Fed., Suzaka, 382, Japan
SOURCE: Denpun Kagaku (1993), 40(3), 263-9
CODEN: DPNKAV; ISSN: 0021-5406

DOCUMENT TYPE: Journal
LANGUAGE: Japanese

AB Rice starch granules were treated with *alpha*-*amylase*, *glucoamylase*, and *beta*-*amylase* under various conditions and changes in the characteristics of the starch granules due to enzyme treatments were investigated. *Glucoamylase* and *alpha*-*amylase* degraded rice starch granules and made many holes in their surfaces, whereas, *beta*-*amylase* had little degrading effect. From observations by scanning electron microscopy, it was found that the holes made by *alpha*-*amylase* were large and deep. Also *beta*-*amylase* made deeper holes than those of *alpha*-*amylase*. The number and size of the holes increased with the degree of the enzymic degradation. The starch granules were treated by *alpha*-*amylase* until the degree of degradation reached the range of 0.5-apprx.3.0%, and then, the suspension of the granules was subjected to a micro-viscog. anal. The amount of *alpha*-*amylase* adsorbed on the surface of the starch granule was 0.36-4.8 IU/g over the range of degradation. The starch granules adsorbing the enzymes were *gelatinized* and yielded a thin paste. However, no marked change in the rheol. properties of the starch granules treated with *beta*-*amylase* or *glucoamylase* was observed even when the degradation was large, when compared with those of the granules prior to treatment.

L12 ANSWER 32 OF 69 HCAPLUS COPYRIGHT 2007 ACS ON STN
ACCESSION NUMBER: 1992:429134 HCAPLUS
DOCUMENT NUMBER: 117:29134
TITLE: Preparation of cereal starch hydrolyzates containing at least 95% glucose
INVENTOR(S): Anger, Horst; Richter, Manfred; Kettlitz, Bernd; Schirner, Rolf; Hausier, Gerhard; Roick, Thomas

PATENT ASSIGNEE(S): Zentralinstitut fuer Ernaehrung, Germany
SOURCE: Ger. (East), 5 pp.
CODEN: GEXXAB
DOCUMENT TYPE: Patent
LANGUAGE: German
FAMILY ACC. NUM. COUNT: 1
PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
DD 298431	A5	19920220	DD 1989-332057	19890824
PRIORITY APPLN. INFO.: DD 1989-332057 19890824				
AB In the title process, giving products for food and tech. use, aqueous suspensions of 20-30% starch are treated with <i>glucoamylase</i> (I) and small amts. of <i>alpha</i> - <i>amylase</i> (II) at pH 3.5-5.5 and temps. 53° above the <i>gelatinization</i> temperature of the starch used for 12-96 h and the hydrolyzate is separated from unreacted starch. Stirring 500 g aqueous slurry of 146 g rye starch (85.6% dry solids) with 50 mg NaHSO ₃ , 10 mg bacterial II (17,910 units/g), and 1.6 mL I from <i>Endomycopsis bispora</i> (2863 units/mL) at pH 5 and 54° for 48 h, centrifuging, and washing the solids with H ₂ O gave an 82.1% solution of hydrolyzate containing glucose 95.3, disaccharides 1.9, and 1.1% oligosaccharides (based on solids).				

L12 ANSWER 33 OF 69 HCAPLUS COPYRIGHT 2007 ACS ON STN DUPLICATE 13
ACCESSION NUMBER: 1993:79668 HCAPLUS
DOCUMENT NUMBER: 118:79668
TITLE: Kinetics of enzymic hydrolysis of cassava flour starch - optimization and modelling
AUTHOR(S): Waliszewski, Krzysztof N.; Garcia Alvarado, Miguel; De la Cruz Medina, Javier
CORPORATE SOURCE: Inst. Technol., Veracruz, Mex.
SOURCE: International Journal of Food Science and Technology (1992), 27(4), 465-72
CODEN: IJFTEZ; ISSN: 0950-5423

DOCUMENT TYPE: Journal
LANGUAGE: English

AB This study was conducted to model the kinetics of cassava flour hydrolysis by Miles Taka-Therm L-170 *alpha*-*amylase* and diastase L-200 *glucoamylase* to produce glucose syrup. Maximum starch concentration was 3% due to a controlled process of flour *gelatinization* by gradual temperature increase, and parallel starch hydrolysis by thermostable *alpha*-*amylase* activity, preventing excess viscosity. The time of hydrolysis was two and half hours of *alpha*-*amylase* activity and 36 h of *glucoamylase* activity with the final yield of 90-93% of glucose. Exponential hyperbolic models were obtained to predict the kinetics of hydrolysis by both *amylase* and *glucoamylase*, with a generalized correlation coefficient >0.94.

L12 ANSWER 34 OF 69 HCAPLUS COPYRIGHT 2007 ACS ON STN
ACCESSION NUMBER: 1992:424906 HCAPLUS
DOCUMENT NUMBER: 117:24906
TITLE: Twin-screw extrusion cooker as a bioreactor for starch processing
AUTHOR(S): Linko, Pekka
CORPORATE SOURCE: Food Science and Technology (New York, NY, United States) (1992), 49(Food Extrusion Sci. Technol.), 335-44
CODEN: FSTEEM; ISSN: 0891-8961

DOCUMENT TYPE: Journal
LANGUAGE: English

AB Most work described was done either by a Clextral BC 45 or with a Werner and Pfleiderer Continua 58 twin-screw extruder. The length of the screws

in the former was 600 mm with 50 mm reverse pitch elements at the die end, and in the latter, 1222.5 mm with 75 mm reverse screw elements were placed at 470 mm distance for efficient starch gelatinization, and 3 short mixing elements at 590 mm, 835 mm, and 1080 mm distance from the beginning. The feed rate was kept constant at about 12 kg/h (d.m.) and 30 kg/h (d.m.), resp. Industrial grade barley and wheat starch, and milled whole barley and oats were used as raw material. Thermostable *Bacillus licheniformis* α -amylase Termanyl was used for liquefaction, and either *Aspergillus niger* *glucoamylase* 150L or barley β -amylase (ABM 1500L) and *Klebsiella aerogenes* pullulanase (ABM pullzyme S 2000) were used for saccharification. The state of the are in the novel concept of using a twin-screw extrusion cooker as a continuous bioreactor in starch processing is presented.

L12 ANSWER 35 OF 69 HCAPLUS COPYRIGHT 2007 ACS ON STN

ACCESSION NUMBER: 1993:253761 HCAPLUS

DOCUMENT NUMBER: 118:253761

TITLE: Properties of α -amylase and glucoamylase from

Aspergillus awamori

AUTHOR(S): Yasuda, Masaki; Yamada, Takeshi; Ishihara, Masanobu;

Toyama, Seizen

CORPORATE SOURCE: Coll. Agric., Univ. Ryukyus, Okinawa, 901-01, Japan

SOURCE: Ryuky Daigaku Nogakubu Gakujutsu Hokoku (1992), 39, 125-34

CODEN: RDNGBW; ISSN: 0370-4246

DOCUMENT TYPE: Journal

LANGUAGE: Japanese

AB The properties of α -amylase and glucoamylase from a selected strain (*Aspergillus awamori* Nakazawa, IFO 4033) for awamori beverage production were investigated. α -amylase had maximum activity at pH 4.5-5.5 and 65° and was quite stable at pH 3.0-6.0 and up to 60°. Glucoamylase had maximum activity at pH 4.3-5.5 and 60° and was stable at pH 3.5-6.0 and up to 60°. Glucoamylase was active on gelatinized starch prepared from glutinous rice, nonglutinous rice, broken rice imported from Thailand (raw material for awamori beverage, indica type), potato, sweet potato, wheat, corn and soluble starch. The hydrolysis degree of starch prepared from broken rice of Thailand was rapidly increased with time up to 2 h. The limit of hydrolysis of the starch by the enzyme was 82%. The enzyme could digest raw rice starch maximally at pH 3.2-3.5. The enzyme was very active on raw starch of glutinous, nonglutinous, and broken rice but was only slightly active on a raw potato starch.

L12 ANSWER 36 OF 69 HCAPLUS COPYRIGHT 2007 ACS ON STN

ACCESSION NUMBER: 1992:23280 HCAPLUS

DOCUMENT NUMBER: 116:23280

TITLE: Preparation of dextrose and nanofiltration membrane

for its purification

Hadden, Donald K.; Binder, Thomas P.; Sievers, Lowell

J.

INVENTOR(S): Archer-Daniels-Midland Co., USA

PATENT ASSIGNEE(S): Eur. Pat. Appl., 13 pp.

SOURCE: CODEN: EPXWDW

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 2

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 452238	A2	19911016	EP 1991-460016	19910321
EP 452238	A3	19921202		
R: DE, ES, FR, GB, IT				

CA 2038485 A1 19910924 CA 1991-2038485 19910318
JP 04218400 A 19920807 JP 1991-86026 19910325
PRIORITY APPLN. INFO.: US 1990-498344 A 19900323
AB Dextrose (I) is prepared from starch by a process comprising cooking a hydrolyzing the *gelatinized* and dextrinized product with a *glucoamylase*, and filtering the sugar syrup with a monofiltration membrane (A) having pore size capable of passing the I while rejecting salts, di- and trisaccharides or higher mol. weight products. Examples of the A are com. available exp. MW. Series, Filtec NF-40, Filtration English UO, etc.

L12 ANSWER 37 OF 69 BIOSIS COPYRIGHT (c) 2007 The Thomson Corporation on STN DUPLICATE 14

ACCESSION NUMBER: 1992:47668 BIOSIS

DOCUMENT NUMBER: PREV199293027643; BA93:27643

TITLE: STUDIES ON THE PRODUCTION OF HYDROLYZABLE STARCHY MATERIAL

IN HIGH CONCENTRATED SUBSTRATE BY TWO-STAGE EXTRUSION

COOKING METHOD.

AUTHOR(S): HAYAKAWA I [Reprint author]; SAKAMOTO K; HAGITA H; FUJIO Y

CORPORATE SOURCE: LAB FOOD TECHNOL, DEP FOOD SCI TECHNOL, LFAC AGRIC, KYUSHU

UNIV, 6-10-1 CHOME, HAKOZAKI, HIGASHI-KU, FUKUOKA 812

SOURCE: Journal of the Japanese Society for Food Science and Technology (Nippon Shokuhin Kogyo Gakkaishi), (1991) Vol. 38, No. 10, pp. 945-953.

CODEN: NSKGAX. ISSN: 0029-0394.

DOCUMENT TYPE: Article

FILE SEGMENT: BA

LANGUAGE: ENGLISH

ENTRY DATE: Entered STN: 13 Jan 1992

AB One of the production methods of hydrolyzable starchy material under high concentration was developed by the addition of thermostable α -amylase using a twin-screw extruder, in order to get more effective application on white rice bran. Paddle screw elements were more effective than kneading screw elements during the first extrusion. On the second extrusion with the addition of thermostable α -amylase, screws assembled by only forward elements were the best one, because temperature increase of the extrudate was small during extrusion. The highly hydrolyzable starch material manufactured in this series of extrusions was completely *gelatinized* and over 90% of the α -amylase activity was maintained. The starchy material produced by two-stage extrusion process was hydrolyzable up to 50% based on substrate concentration. Moreover, hydrolyzation by the addition of 0.1% (v/w) *glucoamylase* could be brought to about 85% of the reducing sugar ratio based on total substrate as sugars after 48 hr.

L12 ANSWER 38 OF 69 BIOSIS COPYRIGHT (c) 2007 The Thomson Corporation on STN DUPLICATE 15

ACCESSION NUMBER: 1990:44765 BIOSIS

DOCUMENT NUMBER: PREV199090098405; BA90:98405

TITLE: ENZYMIC PRODUCTION OF HIGH-PROTEIN AMARANTH FLOUR AND

CARBOHYDRATE RICH FRACTION

AUTHOR(S): PAREDES-LOPEZ O [Reprint author]; BAREA DE LA ROSA A P;

CARABEZ-TREJO A

CORPORATE SOURCE: UNIDAD IRAPUATO, CIEA-INST POLITECNICO NATL, APDO POSTAL

629, 36500 IRAPUATO GTO, MEX

SOURCE: Journal of Food Science, (1990) Vol. 55, No. 4, pp. 1157-1161.

CODEN: JFDSAZ. ISSN: 0022-1147.

DOCUMENT TYPE: Article

FILE SEGMENT: BA

LANGUAGE: ENGLISH

ENTRY DATE: Entered STN: 7 Oct 1990
Last Updated on STN: 7 Oct 1990

AB. . . process to produce high-protein amaranth flour (HPAF) and carbohydrate rich fraction (CRF) from raw flour were determined. Commercial preparations of *alpha*-*amylase* and *glucoamylase* were used. Conditions for both enzymes were: 20% (w/v) slurries of gelatinized whole flour and 0.10% (v/w) enzyme; for *amylase*, pH 6.5, 70° C and 30 min liquefaction time; for *glucoamylase*, pH 4.5, 60° C and 60 min. The yield of HPAF was 38-39%. HPAF from both enzymes had 26-28% protein.

L12 ANSWER 39 OF 69 BIOSIS COPYRIGHT (c) 2007 The Thomson Corporation on STN
DUPLICATE 16

ACCESSION NUMBER: 1990:261086 BIOSIS
DOCUMENT NUMBER: PREV1990003172; BA90:3172

TITLE: STUDIES ON ISOLATION AND CHARACTERIZATION OF STARCH FROM PEARL MILLET PENNISETUM-AMERICANUM L. LEEKE GRAINS.

AUTHOR(S): WANKHEDE D B [Reprint author]; RATHI S S; GUNJAL B B; PATIL H B; WALDE S G; RODGE A B; SAWATE A R

CORPORATE SOURCE: DCP BIOCHEMISTRY APPLIED NUTRITION, CARBOHYDRATE RESEARCH LABORATORY, MARATHWADA AGRICULTURAL UNIV, PARBHANI 431 402, INDIA

SOURCE: Carbohydrate Polymers, (1990) Vol. 13, No. 1, pp. 17-28. CODEN: CARPOD. ISSN: 0144-8617.

DOCUMENT TYPE: Article
FILE SEGMENT: BA
LANGUAGE: ENGLISH
ENTRY DATE: Entered STN: 5 Jun 1990

AB. . . basis. The starch exhibited two-stage swelling and moderate solubility patterns in an aqueous medium. The starch contained 22.8% amylose. The gelatinization temperature range of the starch was 69.5-74.0-77.5°C. The viscomylographic examination on starch paste (8% w/v) showed a peak viscosity of . . . increased abruptly (885.0 BU) during cooling (50°C) probably due to retrogradation of amylose. The extent and modes of attack by *glucoamylase* and human salivary *alpha*-*amylase* on the native starch granules as viewed by scanning electron microscopy were investigated.

L12 ANSWER 40 OF 69 HCAPLUS COPYRIGHT 2007 ACS on STN
ACCESSION NUMBER: 1989:613634 HCAPLUS
DOCUMENT NUMBER: 111:213634

TITLE: Cereal products sweetened by enzymic hydrolysis of starch to generate glucose and fructose in situ

INVENTOR(S): Maselli, John A.; Neideman, Saul L.; Antrim, Richard L.; Johnson, Richard A.

PATENT ASSIGNEE(S): Nabisco/Cetus Food Biotechnology Research Partnership, USA; Nabisco Brands, Inc.

SOURCE: Eur. Pat. Appl., 28 pp. CODEN: EPXXDW

DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
EP 312220	A1	19890419	EP 1988-308957	19880927
R: AT, BE, CH, DE, ES, FR, GB, GR, IT, LI, LU, NL, SE				
US 4857339	A	19890815	US 1987-101561	19870928
US 4859474	A	19890822	US 1987-101564	19870928
WO 8902705	A1	19890406	WO 1988-US3277	19880927
W: AU, JP, NO, SU, US				
AU 8927902	A	19890418	AU 1989-27902	19880927

CN 1034304 A 19890802 CN 1988-106895 19880927
CA 1332123 C 1988-578550 19880927
CA 1337679 C 1988-578546 19880927
US 1987-101561 A 19870928
US 1987-101564 A 19870928
WO 1988-US3277 A 19880927

PRIORITY APPLN. INFO.:
Cereal products, e.g. breakfast cereals, are sweetened by limited enzymic hydrolysis of partially gelatinized storage polysaccharides to release glucose which is converted to fructose with glucose isomerase if necessary. Treatments may be at any stage of the grain processing depending upon requirements and the stability of the enzymes involved. Unmilled whole wheat berries were used to prepare shredded cereal biscuits. The preparation of the grains involved heating the grains 100 g in H₂O 700 mL at 100° for 30 min. and cooling to 85° before shredding and baking. Combinations of *alpha*-*amylase* and *glucoamylase* were added at the cooking stage, and glucose isomerase added after the cooking stage. Samples were processed after 2 h or tempered for 18 h before further processing. Tempered samples showed consistently higher reducing sugar content (40-80% higher, approx. 3.5 g reducing sugar/100 g dried wheat) and were sweeter to taste. Samples treated with glucose isomerase had a sweeter taste than would be expected from reducing sugar content.

L12 ANSWER 41 OF 69 BIOSIS COPYRIGHT (c) 2007 The Thomson Corporation on STN
DUPLICATE 17

ACCESSION NUMBER: 1989:308144 BIOSIS
DOCUMENT NUMBER: PREV19898021874; BA88:21874

TITLE: STUDIES ON ISOLATION AND CHARACTERIZATION OF STARCH FROM RAJGEERA GRAINS AMARANTHUS-PANICULATUS LIN.

AUTHOR(S): WANKHEDE D B [Reprint author]; GUNJAL B B; SAWATE R A; PATIL H B; BHOSALE M B; GAHILOD A T; WALDE S G

CORPORATE SOURCE: CARBOHYDRATE RES LAB, MARATHWADA AGRIC UNIV, PARBHANI-431 402 INDIA

SOURCE: Starch, (1989) Vol. 41, No. 5, pp. 167-171. CODEN: STARDD. ISSN: 0038-9056.

DOCUMENT TYPE: Article
FILE SEGMENT: BA
LANGUAGE: ENGLISH
ENTRY DATE: Entered STN: 30 Jun 1989

AB. . . The amylopectin content was 88.5% indicating the starch of rajgeera is probably waxy in nature. Amyolytic digestibility of native and gelatinized starch of rajgeera by human salivary *alpha*-*amylase* and *glucoamylase* was investigated.

L12 ANSWER 42 OF 69 BIOSIS COPYRIGHT (c) 2007 The Thomson Corporation on STN
DUPLICATE 18

ACCESSION NUMBER: 1989:267500 BIOSIS
DOCUMENT NUMBER: PREV19898003582; BA88:3582

TITLE: STUDIES ON PHYSICO-CHEMICAL PASTING CHARACTERISTICS AND AMYLOLYTIC SUSCEPTIBILITY OF STARCH FROM SORGHUM

AUTHOR(S): WANKHEDE D B [Reprint author]; DESHPANDE H W; GUNJAL B B; BHOSALE M B; PATIL H B; GAHILOD A T; SAWATE A R; WALDE S G

CORPORATE SOURCE: CARBOHYDRATE RES LAB, MARATHWADA AGRIC UNIV, PARBHANI 431 402, INDIA

SOURCE: Starch, (1989) Vol. 41, No. 4, pp. 123-127. CODEN: STARDD. ISSN: 0038-9056.

DOCUMENT TYPE: Article
FILE SEGMENT: BA
LANGUAGE: ENGLISH
ENTRY DATE: Entered STN: 6 Jun 1989

AB. . . considerably during cooking (viz. holding period of 30 min at 93°C).

The amylose content of the starch was 23.45%. The *gelatinization* temperature range was found to be 68.5-72.5-78.5°C. The results indicated that the native starch hydrolyzed to a limited extent by human salivary *alpha*-*amylase* and *glucoamylase* as compared to *gelatinized* starch. In addition, the mode of attack by amylolytic enzymes on the native starch granules viewed by SEM has been.

L12 ANSWER 43 OF 69 BIOSIS COPYRIGHT (c) 2007 The Thomson Corporation on STN
DUPLICATE 19

ACCESSION NUMBER: 1989:135329 BIOSIS
DOCUMENT NUMBER: PREV198987069982; BA87:69982
TITLE: EFFECTS OF THERMAL PROCESSING OF WHEAT ON STARCH I. PHYSICO-CHEMICAL AND FUNCTIONAL PROPERTIES.
AUTHOR(S): HOLM J [Reprint author]; BJÖRCK I; ELIASSON A-C
CORPORATE SOURCE: UNIV LUND, CHEMICAL CENTRE, DEP FOOD CHEM, PO BOX 124, S-221 00 LUND, SWED
SOURCE: Journal of Cereal Science, (1988) Vol. 8, No. 3, pp. 249-260.
CODEN: JCSODA. ISSN: 0733-5210.
DOCUMENT TYPE: Article
FILE SEGMENT: BA
LANGUAGE: ENGLISH
ENTRY DATE: Last Updated on STN: 10 Mar 1989

AB. . . lower limit (1) of what is normally used commercially. The starch of both steam-flaked and dry-autoclaved (1) wheat samples was *gelatinized* incompletely as measured by differential scanning calorimetry (DSC) or enzymically with *glucoamylase*. DSC-measurements also indicated an increased resistance to further *gelatinization* of starch in dry-autoclaved (1) wheat, as shown by an increase of 9°C in the *gelatinization* temperature. Extrusion-cooking and popping led to macromolecular degradation of starch, as observed by gel permeation chromatography. Starch degradation was most . . . viscosities at low temperatures, which increased on heating, and low water solubilities of starch. The amylograms also indicated remaining intrinsic *alpha*-*amylase* activity in popped (1), dry-autoclaved and steam-flaked wheat.

L12 ANSWER 44 OF 69 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 1989:56090 HCAPLUS
DOCUMENT NUMBER: 110:56090
TITLE: Enzymic method for the determination of starch in wheat flour preparations
AUTHOR(S): Sasatani, Takasi; Yamazaki, Mitsuhiro; Sasaki, Kunio; Miyazaki, Hiroshi
CORPORATE SOURCE: Tokyo Customs Lab., Tokyo, 108, Japan
SOURCE: Kanzei Chuo Bunsekishonho (1988), 28, 17-21
CODEN: KCBSDI; ISSN: 0286-1933
DOCUMENT TYPE: Journal
LANGUAGE: Japanese
AB An enzymic method for determination of starch in wheat flour preps. using *glucoamylase* and *alpha*-*amylase* was examined. Starch was adequately *gelatinized* by 2 N NaOH solution in a water bath at 45° for 15 min. The enzymic method making use of *glucoamylase* from *Rhizopus niveus* in combination with *alpha*-*amylase* from *Bacillus subtilis* was the best method for saccharification of starch in a wheat flour preparation. Glucose produced by saccharification was determined by the Hanes method. Little influence of various additives such as sucrose, skim milk, salt, soybean oil and NaHCO₃ was observed

L12 ANSWER 45 OF 69 BIOSIS COPYRIGHT (c) 2007 The Thomson Corporation on STN
DUPLICATE 20

ACCESSION NUMBER: 1986:204634 BIOSIS
DOCUMENT NUMBER: PREV198681095934; BA81-95934
TITLE: DUAL ENZYME METHOD FOR DETERMINATION OF TOTAL NONSTRUCTURAL CARBOHYDRATES.
AUTHOR(S): KHALELUDDIN K [Reprint author]; BRADFORD L
CORPORATE SOURCE: US DEP AGRIC, AGRIC RES SERVICE, SOUTHERN PLAINS RANGE RES STN, WOODWARD, OKLA 73801, USA
SOURCE: Journal of the Association of Official Analytical Chemists, (1986) Vol. 69, No. 1, pp. 162-166.
CODEN: JANCA2. ISSN: 0004-5756.

DOCUMENT TYPE: Article
FILE SEGMENT: BA
LANGUAGE: ENGLISH
ENTRY DATE: Entered STN: 28 May 1986
Last Updated on STN: 28 May 1986
AB Total nonstructural carbohydrates (TNC) in plant tissue are underestimated by single enzyme (*alpha*-*amylase* or *glucoamylase*) extraction and overestimated by mild acid hydrolysis. A combination of *glucoamylase* and mycolase degraded starch completely to glucose at 60° C and pH 4.9. This dual enzyme extraction procedure was effective. . . for maximum TNC values. Lead acetate precipitation of the protein in the dual enzyme extracts interfered with the copper-iodometric titration. *Gelatinization* of starch in plant tissue by autoclaving gave higher TNC values than heating on a hot plate for 5 min..

L12 ANSWER 46 OF 69 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 1986:459540 HCAPLUS
DOCUMENT NUMBER: 105:59540
TITLE: Effect of microwave irradiation on potato starch granules

AUTHOR(S): Hagiwara, Shigeko; Esaki, Kimiko; Mishiya, Koji; Kitamura, Shinichi; Kuge, Takashi
CORPORATE SOURCE: Dep. Food Sci., Kyoto Prefect. Univ., Kyoto, 606, Japan

SOURCE: Denpun Kagaku (1986), 33(1), 1-9
CODEN: DPNKAV; ISSN: 0021-5406

DOCUMENT TYPE: Journal
LANGUAGE: Japanese

AB Effects of microwave irradiation at 2450 MHz on the properties of potato starch (I) [9005-25-8] granules in a closed test tube were studied at 85-150° and at various moisture levels (moisture content of I, 5-25%). Microwave heating did not alter the x-ray diffraction pattern, but weakened the sharpness of the pattern with an increase in the amorphous region. The sharpness of B-crystalline peaks of microwave-treated I was partially recovered by steeping in H₂O. The *gelatinization* properties of microwave-treated I were similar to those of heat-moisture-treated I. The susceptibility of I to *alpha*-*amylase* (EC 3.2.1.1) [9000-90-2] and *glucoamylase* (EC 3.2.1.3) [9012-08-0] was increased greatly by irradiation in parallel with an increase in the capacity to adsorb amylases.

L12 ANSWER 47 OF 69 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 1986:3194 HCAPLUS
DOCUMENT NUMBER: 104:3194
TITLE: Raw-starch digesting enzymes of *Aspergillus* sp. K-27
AUTHOR(S): Abe, Junichi; Bergmann, Frederico W.; Obata, Kazuaki; Hazukuri, Susumu
CORPORATE SOURCE: Fac. Agric., Kagoshima Univ., Kagoshima, 566, Japan
SOURCE: Denpun Kagaku (1985), 32(2), 128-35
CODEN: DPNKAV; ISSN: 0021-5406

DOCUMENT TYPE: Journal
LANGUAGE: Japanese
AB The thermophilic fungus, *Aspergillus* K-27, produced extracellular

amylolytic enzymes in a submerged culture at 45° with wheat starch as a C source. By adding α-methyl-D-glucoside to the medium, the enzyme production doubled at 5 days incubation. The enzymes strongly digested not only cereal but also tuber and root starches without *gelatinization*. The crude enzyme fraction exhibited 22 different activities, *glucoamylase* and *α-amylase*; the former was the major activity. The *glucoamylase* of K-27 showed higher ability to digest raw starch than did the enzymes of A. niger and R. delemere *α-amylase*. *Amylase* did not digest raw starch effectively, but it greatly stimulated the activity of the *glucoamylase*.

L12 ANSWER 48 OF 69 HCAPLUS COPYRIGHT 2007 ACS on STN
 ACCESSION NUMBER: 1984:190339 HCAPLUS
 DOCUMENT NUMBER: 100:190339
 TITLE: Fructose production
 INVENTOR(S): Bolgar, Pal; Juhasz, Tibor; Toth, Janos; Koncsiki, Ferenc; Szatmari, Ed; Bende, Pal; Hollo, Janos; Laszlo, Elemer; Koschke, Agoston; et al.
 PATENT ASSIGNEE(S): Naarden International N. V., Neth.
 SOURCE: U.S.S.R. From: Ockrytiya, Izobret., Prom. Obraztsey, Tovarnye Znaki 1984, (5), 235.
 CODEN: URXXAF
 DOCUMENT TYPE: Patent
 LANGUAGE: Russian
 FAMILY ACC. NUM. COUNT: 2
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
SU 1072817	A3	19840207	SU 1978-2575800	19780203
SU 1400363	A	19740801	NL 1974-363	19740110
BE 809785	A1	19740715	BE 1974-139846	19740115
ZA 7400357	A	19741127	ZA 1974-357	19740117
RU 7464646	A	19750724	RU 1974-64646	19740118
CS 174229	B2	19770331	CS 1974-549	19740128
FR 2215467	A1	19740823	FR 1974-2912	19740129
GB 1456262	A	19761124	GB 1974-4060	19740129
AT 7400702	A	19761215	AT 1974-702	19740129
AT 338714	B	19770912		
HU 1973-G01229 A 19730130				

PRIORITY APPLN. INFO.:
 AB Fructose [57-48-7] is produced from *gelatinized* starch [9005-25-8] by the combined action of *α-amylase* [9000-90-2], *glucoamylase* [9032-08-0], and glucose isomerase [9055-00-9].

L12 ANSWER 49 OF 69 HCAPLUS COPYRIGHT 2007 ACS on STN
 ACCESSION NUMBER: 1984:549968 HCAPLUS
 DOCUMENT NUMBER: 101:149968
 TITLE: Digestibility of amylose-lipid complexes in vitro and in vivo
 AUTHOR(S): Holm, J.; Bjoerck, I.; Ostrowska, S.; Eliasson, A. C.; Asp, N. G.; Larsson, K.; Lundquist, I.
 CORPORATE SOURCE: Dep. Food Chem., Univ. Lund, Lund, S-220 07, Swed.
 SOURCE: Fats (Lipids) Baking Extrusion, Contrib. LIPIDFORUM Symp. (1984), Meeting Date 1983, Sz-S. Editor(s): Marcuse, Reinhard. LIPIDFORUM: Goeteborg, Swed.
 CODEN: 51SHAD
 DOCUMENT TYPE: Conference
 LANGUAGE: English
 AB Amylose from potato was complexed with lysolecithin and oleic acid. The complexes displayed substantially reduced susceptibility to hog pancreatic *α-amylase* in vitro, when compared to free amylose in solution. Amylose-lysolecithin complexes disappeared completely

from the rat gastrointestinal tract within 120 min, indicating that the complexes amylose was hydrolyzed and absorbed to the same extent as free amylose in vivo. However, the plasma glucose and the plasma insulin responses indicated a somewhat slower degradation and absorption of complexed amylose compared to free amylose that is consistent with the slower degradation of amylose-lipid complexes in vitro. The presence of the bacterial thermostable *α-amylase*, Termamyl, in the *gelatinization* step eliminated the contribution of the complex in an enzymic dietary fiber anal., and increased the result of a starch [9005-25-8] anal. using *glucoamylase* at 60°.

L12 ANSWER 50 OF 69 BIOSIS COPYRIGHT (c) 2007 The Thomson Corporation on STN
 ACCESSION NUMBER: 1984:177791 BIOSIS
 DOCUMENT NUMBER: PREV198477010775; BA77:10775
 TITLE: CONTINUOUS PRODUCTION OF HIGH GLUCOSE SYRUP BY CHITIN IMMOBILIZED AMYLASE.
 AUTHOR(S): FLOR P O [Reprint author]; HAYASHIDA S
 CORPORATE SOURCE: LAB APPL MICROBIOL, DEP AGRIC CHEM, KYUSHU UNIV, 46 FUKUOKA 812, JPN
 SOURCE: Biotechnology and Bioengineering, (1983) Vol. 25, No. 8, PP. 1973-1980.
 CODEN: BIBIAU. ISSN: 0006-3592.

DOCUMENT TYPE: Article
 FILE SEGMENT: BA
 LANGUAGE: ENGLISH
 AB A simple method of preparing a chitin-immobilized *α-amylase* and *glucoamylase* from the protease- and glycosidase-less mutant HF-15 of *Aspergillus awamori* var. kawachi was developed and used for the production of high-glucose syrup. The *glucoamylase* was tightly bound to chitin without the aid of a crosslinking agent because the enzyme contained a specific binding site for chitin. Continuous production of high glucose concentrate from a highly concentrated *α-amylase*-treated *gelatinized* starch substrate (apprx. 45% total solids) was undertaken successfully with the use of a column-packed chitin-immobilized amyase. The activity of. . . contamination, indicating that the immobilized amyase had no transglucosidation activity. The immobilized amyase was most active in the conversion of *gelatinized* starch to glucose at 55° C and pH 2.5-5.0. Drying the chitin-immobilized amyase decreased the activity and shortened storage life.

L12 ANSWER 51 OF 69 BIOSIS COPYRIGHT (c) 2007 The Thomson Corporation on STN
 ACCESSION NUMBER: 1984:266264 BIOSIS
 DOCUMENT NUMBER: PREV198478002744; BA78:2744
 TITLE: ENZYMIC CONVERSION OF STARCH IN TWIN SCREW HTST EXTRUDER.
 AUTHOR(S): HANULIN S [Reprint author]; LINKO Y-I; LINKO P; SELER K; SEIBEL W
 CORPORATE SOURCE: FEDERAL RESEARCH CENTRE GRAIN AND POTATO PROCESSING, INST BAKING TECH, D-4930 DETMOLD
 SOURCE: Starch, (1983) Vol. 35, No. 12, pp. 411-414.
 CODEN: STARDP. ISSN: 0038-9056.

DOCUMENT TYPE: Article
 FILE SEGMENT: BA
 LANGUAGE: ENGLISH
 AB Wheat starch was liquefied to DE [dextrose equivalent] 25-30 employing heat stable *α-amylase* and twin-screw Werner and Pfeiderer Continua 58 HTST-extruder. Most significant saccharification time was obtained when starch was. . . at 120° C mass temperature, feed rate 1500 g min-1 and screw rotation rate 250 min-1; 0.9% Novo Termamyl 120L *α-amylase* was added immediately after initiation of *gelatinization* in the extruder. Saccharification was carried out at 60° C, employing

0.36% Novo *glucoamylase* 150L to reach a DE96 in 22 h. Best total conversion was obtained when also saccharification was initiated in extruder by adding *glucoamylase* just before the die element, after lowering mass temperature to 60° C and by allowing the saccharification to continue atomic

L12 ANSWER 52 OF 69 BIOSIS COPYRIGHT (c) 2007 The Thomson Corporation on STN DUPLICATE 22

ACCESSION NUMBER: 1984:258149 BIOSIS
DOCUMENT NUMBER: PREV198477091133; BA77-91133
TITLE: ENZYMIC HYDROLYSIS OF STARCH AND CEREAL FLOURS AT INTERMEDIATE MOISTURE CONTENTS IN A CONTINUOUS EXTRUSION REACTOR.

AUTHOR(S): CHOVEL H [Reprint author]; CHAY P B; CHEFTEL J C
CORPORATE SOURCE: LAB BIOCHIM TECHNO ALIMENTAIRES, UNIV SCI TECH, PLACE E BATAILLON 34060 MONTPELLIER
SOURCE: Lebensmittel-Wissenschaft und Technologie, (1983) Vol. 16, No. 6, pp. 346-353.
CODEN: LEWTAP. ISSN: 0023-6438.

DOCUMENT TYPE: Article
FILE SEGMENT: BA
LANGUAGE: ENGLISH
AB Continuous liquefaction of pregelatinized corn starch with a thermostable *.alpha.-amylase* was carried out in a twin screw extruder. The influence of pH, temperature, water content, enzyme/substrate ratio and addition of . . . of 2-8 min, gave syrups of low viscosity and high solubility with DE [dextrose equivalents] close to 20%. The combined *gelatinization* and liquefaction of raw corn starch were also carried out continuously by single passage in a long barrel extruder, with *.alpha.-amylase* injection at mid-barrel. *Gelatinization* at 130°-140° C and 65% dry solids in the first 600 mm of screw length, followed by enzymatic liquefaction at 60°-70° C, with or without addition of in a stirred tank at 60°-70° C, flour or whole corn flour were further incubated in *glucoamylase*. Without *glucoamylase*, maximum DE of 20-50% and glucose contents of 5-9% were reached 3 h after extrusion, due to residual *.alpha.-amylase* activity. With *glucoamylase*, DE of 33-88% and glucose contents of 28-72% were reached 1 h after extrusion and increased upon storage at room temperature. The syrups obtained with *glucoamylase* contained 55% dry solids, had water activities of .apprx. 0.93, pH of 4.5 and low microbial loads. Their shelf life . . .

L12 ANSWER 53 OF 69 BIOSIS COPYRIGHT (c) 2007 The Thomson Corporation on STN DUPLICATE 23

ACCESSION NUMBER: 1984:313443 BIOSIS
DOCUMENT NUMBER: PREV198478049923; BA78:49923
TITLE: DIGESTIBILITY OF AMYLOSE LIPID COMPLEXES IN-VITRO AND IN-VIVO.

AUTHOR(S): HOLM J [Reprint author]; BJORCK I; OSTROWSKA S; ELIASSEN A-C; ASP N-G; LARSSON K; LUNDQUIST I
CORPORATE SOURCE: DEP FOOD CHEMISTRY, UNIV LUND, PO BOX 740, S-220 07 LUND, SWED
SOURCE: Starch, (1983) Vol. 35, No. 9, pp. 294-297.
CODEN: STARD. ISSN: 0038-9056.

DOCUMENT TYPE: Article
FILE SEGMENT: BA
LANGUAGE: ENGLISH
AB Amylose from potatoes was complexed with lysolectin and oleic acid. The degradation of complexed amylose by hog pancreatic *.alpha.-amylase* in-vitro was studied, as well as the in-vivo absorption in the rat. The presence of a bacterial thermostable *.alpha.-amylase* in the *galactinization* step increased the result of a starch analysis using *glucoamylase*. Complexed amylose

displayed a substantially reduced susceptibility to *.alpha.-amylase* in-vitro. However, when adding a large excess of enzyme, the complex was completely hydrolyzed after 3 h. Amylose-lysolectin complex disappeared.

L12 ANSWER 54 OF 69 BIOSIS COPYRIGHT (c) 2007 The Thomson Corporation on STN DUPLICATE 24

ACCESSION NUMBER: 1983:194651 BIOSIS
DOCUMENT NUMBER: PREV198375044651; BA75:44651
TITLE: RAW STARCH DIGESTIVE CHITIN IMMOBILIZED AMYLASE FROM A PROTEASE GLYCOSIDASE LESS MUTANT OF ASPERGILLUS-ANAMORI-VAR-KAWACHI.

AUTHOR(S): HAYASHIDA S [Reprint author]; FLOR P Q
CORPORATE SOURCE: DEPARTMENT OF AGRICULTURAL CHEMISTRY, KYUSHU UNIVERSITY, FUKUOKA 812, JAPAN
SOURCE: Agricultural and Biological Chemistry, (1982) Vol. 46, No. 6, pp. 1639-1646.
CODEN: ABCHA6. ISSN: 0002-1369.

DOCUMENT TYPE: Article
FILE SEGMENT: BA
LANGUAGE: ENGLISH
AB The *.alpha.-amylase* and *glucoamylase* produced by a protease-, glycosidase-less mutant HF-15 of *A. awamori* var. kawachi were adsorbable onto chitin. This adsorption was pH-independent. . . a cross-linking agent, glutaraldehyde; it retained > 90% of the original activity of the free enzyme. The immobilized *amylase* digested *gelatinized* potato starch, glycogen and even raw corn starch to the same high extent as glucose similar to the free enzyme. . .

L12 ANSWER 55 OF 69 HCAPLUS COPYRIGHT 2007 ACS on STN DUPLICATE 25

ACCESSION NUMBER: 1983:30579 HCAPLUS
DOCUMENT NUMBER: 98:30579
TITLE: Preparation and properties of the raw starch-digestive chitin-immobilized amylase

AUTHOR(S): Flor, Perfecto Q.; Hayashida, Shinsaku
CORPORATE SOURCE: Dep. Agric. Chem., Kyushu Univ., Fukuoka, 812, Japan
SOURCE: Chitin Chitosan, Proceeding Int. Conf., 2nd (1982), 153-8. Editor(s): Hirano, Shigehiro; Tokura, Seichi.
Jpn. Soc. Chitin Chitosan: Tottori, Japan.
CODEN: 48XAAL

DOCUMENT TYPE: Conference
LANGUAGE: English
AB The raw starch-digestive *glucoamylase* I (I) of *Aspergillus awamori* kawachi was adsorbed onto chitin, whereas the other 2 types of raw starch-indigestive *glucoamylases* I' and II were not adsorbed onto chitin. This chitin-immobilized I hydrolyzed *gelatinized* starch and glycogen to high extents as glucose similar to the free enzyme, but failed to digest raw starches, because *glucoamylase* I was adsorbed at the raw starch-affinity site. I and raw starch-adsorbable *.alpha.-amylase* produced by a protease- glycosidase-less mutant HF-15 of the same mold strain under cultural conditions were adsorbable onto chitin independent of pH. These amylases were tightly bound onto chitin without the aid of a crosslinking agent, glutaraldehyde. The chitin-immobilized mutant amylase retained >90% of the original activity of the free enzyme and hydrolyzed *gelatinized* starch, similar to glycogen, and even raw starch to the high extents as glucose, similar to the free enzyme, but different from the unbound crude enzyme in having no transglucosidase activity and slightly different in pH and thermo-stabilities. The experiment with the immobilized mutant amylase for alc. fermentation demonstrated the possibility of recycling the enzyme for raw starch saccharification. The purified mutant *glucoamylase* mol. which has a mol. weight of 250,000 had a specific chitin-binding site which was different from the active and raw starch-affinity sites.

L12 ANSWER 56 OF 69 BIOSIS COPYRIGHT (c) 2007 The Thomson Corporation on
STN
DUPLICATE 25

ACCESSION NUMBER: 1981:266820 BIOSIS
DOCUMENT NUMBER: PREV19817051804; BA72:51804
TITLE: ISOLATION AND PHYSICO-CHEMICAL PROPERTIES OF STARCH
EXTRACTED FROM ELAPPHANT YAM AMORPHOPHALLUS-CAMPANULATUS.
AUTHOR(S): WANKHEDE D B [reprint author]; SAJJAN S U
CORPORATE SOURCE: DISCIPLINE OF BIOCHEM AND APPLIED NUTRITION, CENT FOOD
TECHNOL RES INST, MYSORE 570013, INDIA
SOURCE: Starch, (1981) Vol. 33, No. 5, pp. 153-157.
CODEN: STARDD. ISSN: 0038-9056.

DOCUMENT TYPE: Article
FILE SEGMENT: BA
LANGUAGE: ENGLISH
AB. . . the starch was 24.5%. The viscosity decreased considerably during
cooking at 90° C. The amylolytic susceptibility of the native and
gelatinized starch with human salivary **.alpha.-**
amylase and **glucoamylase** were also investigated.

L12 ANSWER 57 OF 69 BIOSIS COPYRIGHT (c) 2007 The Thomson Corporation on
STN
DUPLICATE 26

ACCESSION NUMBER: 1981:196251 BIOSIS
DOCUMENT NUMBER: PREV19817066243; BA71:66243
TITLE: ISOLATION AND PHYSICO-CHEMICAL PROPERTIES OF STARCH FROM
WINGED BEAN PSOPHOCARPUS-TETRAGONOLORUS.
AUTHOR(S): UNADEVI S [reprint author]; WANKHEDE D B
CORPORATE SOURCE: DISCIPLINE BIOCHEM APPL NUTR, CENT FOOD TECHNOL RES INST,
MYSORE 570013 INDIA
SOURCE: Starch, (1981) Vol. 33, No. 1, pp. 23-26.
CODEN: STARDD. ISSN: 0038-9056.

DOCUMENT TYPE: Article
FILE SEGMENT: BA
LANGUAGE: ENGLISH
AB Preparation and physicochemical properties of winged bean starch were
studied. **Gelatinization** temperature range was 60-70° C
and it exhibited single stage swelling and low solubility. The extensive
solubility in dimethylsulfoxide may be due to heterogeneous bonding forces
within the granule. The amylolytic susceptibility of native and
gelatinized starch with human salivary **.alpha.-**
amylase and **glucoamylase** was studied. The starch was
non-ionic. The amylose content was 38.5%.

L12 ANSWER 58 OF 69 BIOSIS COPYRIGHT (c) 2007 The Thomson Corporation on
STN
DUPLICATE 26

ACCESSION NUMBER: 1981:146564 BIOSIS
DOCUMENT NUMBER: PREV19817016556; BA71:16556
TITLE: STUDIES ON DETERMINATION OF STARCH IN AGRICULTURAL PRODUCTS
1. EXAMINATION OF THE ENZYMATIC METHOD USING GLUCO AMYLASE.
AUTHOR(S): HASE S [reprint author]; YASUI T
CORPORATE SOURCE: NATL FOOD RES INST, MINIST AGRIC FOR FISH, YATABE, IBARAKI,
JPN
SOURCE: Report of National Food Research Institute, (1980) No. 36,
pp. 98-103.
CODEN: SSKKCY. ISSN: 0301-9780.

DOCUMENT TYPE: Article
FILE SEGMENT: BA
LANGUAGE: JAPANESE
AB. . . starch as test samples, the enzymatic method of starch determination
with glucoamylase was examined. Starch in these samples was well
gelatinized by pretreatment in a boiling water bath followed by
autoclaving at 130° C for 30 min. A crude preparations of
glucoamylase from *Rhizopus niveus* showed stronger saccharifying
power than a highly purified enzyme preparation, which showed only
incomplete saccharification. When **.alpha.-amylase** was

used together with **glucoamylase**, the degree of saccharification
was significantly improved. A crude preparation of maltase from
Aspergillus niger and *K. delemar* used in combination with
glucoamylase showed the enhancing factor is not maltase but **.alpha**
It is inferred that the enhancing factor is not maltase but **.alpha**
-amylase and some other factor(s) in the crude enzyme
preparation. In determination of glucose after saccharification, the
method using glucose oxidase-peroxidase.

L12 ANSWER 59 OF 69 BIOSIS COPYRIGHT (c) 2007 The Thomson Corporation on
STN
DUPLICATE 27

ACCESSION NUMBER: 1980:141085 BIOSIS
DOCUMENT NUMBER: PREV198069016081; BA69:16081
TITLE: ENZYMATIC PROCEDURE FOR DETERMINATION OF STARCH IN CEREAL
PRODUCTS.
AUTHOR(S): BAUR M C [reprint author]; ALEXANDER R J
CORPORATE SOURCE: KRAUSE MILLING CO, MILWAUKEE, WIS 53201, USA
SOURCE: Cereal Chemistry, (1979) Vol. 56, No. 4, pp. 364-366.
CODEN: CECHAF. ISSN: 0009-0352.

DOCUMENT TYPE: Article
FILE SEGMENT: BA
LANGUAGE: ENGLISH
AB. . . of cereal products. The procedure requires about 4 h to perform and
employs standard laboratory equipment. It incorporates a short
gelatinization step at 100° C, high temperature
(85° C) **.alpha.-amylase** hydrolysis, and
conversion of starch to glucose at 60° C with **glucoamylase**
. . . Readily available commercial enzymes were employed. The new procedure
provides accurate starch values as shown by comparison with standard
procedures.

L12 ANSWER 60 OF 69 HCAPLUS COPYRIGHT 2007 ACS on STN
ACCESSION NUMBER: 1979:606421 HCAPLUS
DOCUMENT NUMBER: 91:206421
TITLE: Pilot plant production of glucose with glucoamylase
immobilized to porous silica
AUTHOR(S): Lee, Douglas Dean
CORPORATE SOURCE: Dep. Chem. Eng., Iowa State Univ., Ames, IA, USA
SOURCE: Report (1978), NSF/RA-780474; Order No. PB-295507, 260
pp. Avail.: NTIS
From: Gov. Rep. Announce. Index (U. S.) 1979, 79(18),
94

DOCUMENT TYPE: Report
LANGUAGE: English
AB **Glucoamylase** was immobilized to porous silica and its kinetics
and temperature stability determined in laboratory and pilot scale reactors.
Reaction
rates and stability were measured with acid, **.alpha**-
amylase, and acid-**.alpha.-amylase** thinned corn
starches. The immobilized **glucoamylase** was very stable in both
laboratory and pilot plant packed column reactors, with a half-life at
55° under production conditions of 581 h. The enzyme in the pilot
plant reactor lost approx. 25% of its initial activity after 90+ days of
operation at 38-40° and over one year of storage at 4°.
mostly due to pore blockage by **gelatinized** starch due to
incomplete starch thinning. The method of corn starch thinning to produce
dextrin has a marked effect on final product distribution, glucose
concentration,
and dextrose equivalent

L12 ANSWER 61 OF 69 HCAPLUS COPYRIGHT 2007 ACS on STN
ACCESSION NUMBER: 1979:489886 HCAPLUS
DOCUMENT NUMBER: 91:89886
TITLE: Glucoamylase immobilized on cationic colloidal silica

INVENTOR(S): Holik, Dennis J.; Mueller, Nancy J.
PATENT ASSIGNEE(S): CPC International Inc., USA
SOURCE: Belg., 19 pp.
CODEN: BEXXAL
DOCUMENT TYPE: Patent
LANGUAGE: French
FAMILY ACC. NUM. COUNT: 2
PATENT INFORMATION:

PATENT NO. KIND DATE APPLICATION NO. DATE

BE 870096 A1 19781218 BE 1978-57241 19780831
US 4202939 A 19800513 US 1977-829690 19770901
CA 1105858 A1 19810728 CA 1978-310098 19780825
JP 54049392 A 19790418 JP 1978-105676 19780831
JP 63002595 B 19800119 19780831
AU 7839484 A 19800306 AU 1978-39484 19780901
AU 520531 B2 19820204 19780901
PRIORITY APPL. INFO.: US 1977-829690 A 19770901
AB Active insol. **glucoamylase** (I) [9032-08-0] was prepared by **gelatinizing** a mixture of I with cationic colloidal silica at pH .apprx.6.5, freezing the gel at <.apprx.15° for .apprx.24 h, thawing the solid phase at .apprx.20°, and separating the solid particles containing I; the immobilized I was used to obtain glucose [50-99-7] or syrups containing glucose from a starch [9005-25-8] hydrolyzate. Thus, 180 mL of a solution of 30% cationic colloidal silica and 120 mL water was stirred with 60 mL of a solution containing 3990 units I. The mixture was agitated for 15 min, and 140 mL 1% Na2CO3 was added dropwise, with agitation over 2 h. The gel obtained was frozen at -20° for 24 h, and thawed at room temperature for 5 h. The solid phase was collected and washed, and had an activity of 16 units I/g dry support. An aqueous 25% starch hydrolyzate (dextrose equivalent 29) diluted by .alpha.-**amylase** was passed through a column containing immobilized I. The pH of the hydrolyzate was maintained at 4.3 and the temperature at 45°. The composition of the carbohydrates in the syrup leaving the column, determined by high-pressure liquid chromatog., was dextrose 90.9, disaccharides 2.2, trisaccharides 0.6, and oligosaccharides with 24 units 6.3%. No I activity was detected in the syrup, and the sugar composition of the effluent was almost constant during 8 days of operation.

L12 ANSWER 62 OF 69 BIOSIS COPYRIGHT (c) 2007 The Thomson Corporation on STN
ACCESSION NUMBER: 1979:124378 BIOSIS
DOCUMENT NUMBER: PREV197967004378: BA67:4378
TITLE: PREPARATION AND PROPERTIES OF DE STARCHED MILLED RICE
AUTHOR(S): RESURRECCION A P [Reprint author]; JULIANO B O; EGUIM B O
CORPORATE SOURCE: DEP CHEM, INT RICE RES INST, LOS BANOS, LAGUNA, PHILIPP
SOURCE: Nutrition Reports International, (1978) Vol. 18, No. 1, pp. 17-26.
CODEN: NURIBL. ISSN: 0029-6635.

DOCUMENT TYPE: Article
FILE SEGMENT: BA
LANGUAGE: ENGLISH
AB. Laboratory-scale preparation of destarched milled rice for N balance experiments was studied using commercial *Rhizopus* sp. **glucoamylase** and *Aspergillus oryzae* .**alpha**-**amylase** on 11.1% protein IR480-5-9 rice and 7.1% protein IR32 rice. Contaminant acid protease in the **glucoamylase** reduced the recovery of, and lysine content in, residual protein from raw and cooked rice. **Gelatinization** of starch improved the efficiency of destarching with fungal .**alpha**-**amylase** without change in amino acid pattern of residual protein. destarched rice with 75-80% protein content were obtained in 84-100% recovery. of heat treatment of the Rices. The higher susceptibility of raw IR480-5-9 rice to

alpha-amylolysis was due to the lower **gelatinization** temperature and amylose content of starch as compared to IR32 rice.
L12 ANSWER 63 OF 69 BIOSIS COPYRIGHT (c) 2007 The Thomson Corporation on STN
ACCESSION NUMBER: 1977:173671 BIOSIS
DOCUMENT NUMBER: PREV197763068535: BA63:68535
TITLE: COMPARATIVE SUSCEPTIBILITY TO AMYLASES OF STARCHES FROM DIFFERENT PLANT SPECIES AND SEVERAL SINGLE ENDOSPERM MUTANTS AND THEIR DOUBLE MUTANT COMBINATIONS WITH OPAQUE-2 INBRED OH-43 MAIZE.

AUTHOR(S): FUWA H; NAKAJIMA W; HAMADA A; GLOVER D V
SOURCE: Cereal Chemistry, (1977) Vol. 54, No. 2, pp. 230-237.
CODEN: CECHEP. ISSN: 0009-0352.
DOCUMENT TYPE: Article
FILE SEGMENT: BA
LANGUAGE: Unavailable
AB. (tubers of *Dioscorea batatas* DECNE), and sweet potato were respectively in decreasing order more resistant to the attack of *Rhizopus glucoamylase*, pancreatin and crystalline .**alpha**-**amylase** of *Bacillus subtilis* than were those of maize and rice. Several endosperm mutants, each nearly isogenic in the maize inbred L., their double-mutant combinations with opaque-2, and the normal counterpart, were studied for the relative susceptibility of their granular and **gelatinized** starches to amylases. When opaque-2 was combined with each of the 10 endosperm mutants, i.e., amylose-extender, brittle-1, brittle-2, dull, soft-starch, shrunken-2, sugary-1, sugary-2 and waxy, it was observed that the starch granules of these double mutants were digested by *Rhizopus glucoamylase*, pancreatin and *B. subtilis* .**alpha**-**amylase** to an extent very comparable to their respective nonopaque single-mutant counterpart. Starch granules of the amylose-extender mutant and its double. . among the endosperm mutants and their double-mutant combinations is susceptibility of starch granules to the action of amylases disappeared following **gelatinization** of starches with alkali.

L12 ANSWER 64 OF 69 HCAPLUS COPYRIGHT 2007 ACS on STN
ACCESSION NUMBER: 1976:588440 HCAPLUS
DOCUMENT NUMBER: 85:188440
TITLE: Immobilization of enzymes with a starch-graft copolymer
INVENTOR(S): Weaver, Mary O.; Bagley, Edward B.; Fanta, George F.; Doane, William M.
PATENT ASSIGNEE(S): United States Dept. of Agriculture, USA
SOURCE: U.S., 12 pp. Division of U.S. 3,935,099.
CODEN: USXXAM
DOCUMENT TYPE: Patent
LANGUAGE: English
FAMILY ACC. NUM. COUNT: 4
PATENT INFORMATION:

PATENT NO. KIND DATE APPLICATION NO. DATE

US 3985616 A 19761012 US 1975-611459 19750908
US 3935099 A 19760127 US 1974-456911 19740403
PRIORITY APPL. INFO.: A3 19740403
AB An aqueous fluid-absorbing polymer suitable for immobilization of enzymes was prepared as a graft polymer (I) from **gelatinized** starch and saponified polyacrylonitrile in ratios of from 1:1.5 to 1:1.9, resp. I was capable of absorbing >300 parts of water by weight per part of the water-insol. solids. **Glucoamylase** and .**alpha**-**amylase** were immobilized by mixing the enzyme solution with I, where the polymer absorbs the enzymes and swells, followed by addition of

sufficient water-soluble mineral salts to shrink the polymer and entrap the enzyme within its matrixes.

L12 ANSWER 65 OF 69 HCAPLUS COPYRIGHT 2007 ACS on STN
ACCESSION NUMBER: 1976-87947 HCAPLUS

DOCUMENT NUMBER: 84:87947

TITLE: Enzymic hydrolysis of granular starch

INVENTOR(S): Leach, Harry W.; Hebeda, Ronald E.; Holik, Dennis J.

PATENT ASSIGNEE(S): CPC International Inc., USA

SOURCE: U.S., 14 PP.

CODEN: USXXAM

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 3

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 3922196	A	19751125	US 1974-513198	19741008
US 3865231	A	19750211	US 1974-437457	19740128
ZA 7402102	A	19750430	ZA 1974-2102	19740402
BE 813518	A1	19741010	BE 1974-2053546	19740410
SE 7511221	SE	19760409	SE 1975-11221	19751007
FR 2287509	A2	19760507	FR 1975-30725	19751007
CA 1058106	A1	19790710	CA 1975-237176	19751007
BE 834292	A4	19760408	BE 1975-2054605	19751008
NL 7511796	A	19760412	NL 1975-11796	19751008
DE 2545172	A1	19760422	DE 1975-2545172	19751008
JP 51063952	A	19760602	JP 1975-121752	19751008
US 4113509	A	19780912	US 1976-721926	19760909
ES 457903	A2	19781001	ES 1977-457903	19770416
			US 1973-349899	A2 19730410
			US 1974-437457	A2 19740128
			US 1974-437452	A2 19740128
			US 1974-513198	A 19741008
			US 1975-577523	A 19750514

AB Granular starch [9005-25-8] was solubilized with **alpha**-

anylase [9000-90-2] and 1 or more saccharification enzymes at

temps. above the initial but below the final **gelatinization**

temperature and then was submitted to a saccharification step at a further

reduced temperature in order to avoid the reversion product and starch-fat

complex formation which normally occurs in standard, higher-temperature

acid-enzyme

or enzyme-enzyme processes. Thus, a 25% starch solution at pH 5.5 and

75° was reacted with 2 Th units bacterial **alpha**-

anylase (thermamyli) and 0.14 units **glucoamylase**

[9032-08-0] for 26 hr to yield a 97.6% solubilized starch solution

adjusting the pH to 4.3 and temperature to 60°, 0.14 adnl. units

glucoamylase was added and the slurry saccharified for 120 hr

yielding 95.3% dextrose [50-99-7].

L12 ANSWER 66 OF 69 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 1975-96628 HCAPLUS

DOCUMENT NUMBER: 82:96628

TITLE: Microphotographic and chromatographic studies of wheat

starch grains during enzymic hydrolysis

Popadich, J. A.; Lysyuk, F. A.; Trautenberg, S. E.;

Shub, I. S.

CORPORATE SOURCE: Mosk. Tekhnol. Inst. Pishchevoi Prom., Moscow, USSR

SOURCE: Sakharnaya Promyshlennost (1946-1987) (1975), (1),

60-6

CODEN: SAPRAK; ISSN: 0036-3340

DOCUMENT TYPE: Journal

LANGUAGE: Russian

AB During hydrolysis of wheat starch granules in vitro by purified fungal

amylases (*Aspergillus awamori* **glucoamylase**, *Endomycopsis*

glucoamylase, *A. oryzae* **alpha**-**amylase**, or

amylase F) the outer part of the granules was gradually stripped off while

the center part remained intact. *Bacillus subtilis* **alpha**-

amylase, however, broke the granules into pieces. In contrast to

the bacterial enzyme, the fungal enzymes produced glucose and maltose from

the native starch, and formed very little dextrin. However, with

gelatinized starch, greater quantities of dextrin were formed,

especially in the beginning of the reaction.

L12 ANSWER 67 OF 69 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 1973-402775 HCAPLUS

DOCUMENT NUMBER: 79:2775

TITLE: Hydrolysis of intact leaf starch grains by glucanase

and α -amylase

AUTHOR(S): Bailey, R. W.; Macrae, J. C.

CORPORATE SOURCE: Appl. Biochem. Div., Dep. Sci. Ind. Res., Palmerston

North, N. Z.

SOURCE: FEBS Letters (1973), 31(2), 203-4

CODEN: FEBLAL; ISSN: 0014-5793

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Storage starch grains were prepared from potato, maize, and *Amaranthus*

lividus seed. Leaf starch grains were isolated from white clover

(*Trifolium repens*) and tobacco (*Nicotiana tabacum*) leaves. There was no

hydrolysis of the clover leaf and potato starches, intact or

gelatinized, when they were incubated in buffer in the absence of

glucoamylase. Tobacco leaf starch and maize starch grains gave

similar results. The isolated leaf starch grains, however, were

completely hydrolyzed by fungal **glucoamylase** and by human salivary

alpha-**amylase** without any prior **gelatinization**

treatment, indicating differences in the structure of these grains as

compared to plant storage organ grains.

L12 ANSWER 68 OF 69 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 1971-4885 HCAPLUS

DOCUMENT NUMBER: 74:4885

TITLE: Starch syrup of low viscosity

INVENTOR(S): Sugimoto, Kaname; Hirao, Mamoru; Mitsuhashi, Masakazu;

Ogasawara, Junzuke

PATENT ASSIGNEE(S): Hayashibara Co., Ltd.

SOURCE: Ger. Offen., 13 PP.

CODEN: GWXXBX

DOCUMENT TYPE: Patent

LANGUAGE: German

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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DE 1916726				
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A	19701105	DE 1969-1916726	19690401
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DE 1969-1916726			19690401
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AB Starch syrups with mainly linear oligo- or polysaccharides were prepared by

saccharification of high mol. amylostarch or low mol. amylose prepared by

amylopectin decomposition by α -1,6-glucosidase with amylases. Thus, 35%

sweet potato starch suspension was **gelatinized** in 10 min at

160°, dispersed, cooled in vacuo to 50°, and degraded for 30

min at 45° and pH 6 with 20 units pullulanase/g starch.

ALPHA-**Anylase** (15 units/g) was added. At 60°

and pH 6, reaction for 5 or 20 hr yielding 20 or 70 dextrose equivs.

resp. gave a syrup tasting less sweet in the 1st case with a viscosity

corresponding to a dextrose solution of approx 50 dextrose equivs. and a

reasonably sweet one with a low viscosity in the 2nd. The addition of 1

unit/g of *glucoamylase* from *Rhizopus* to both sirups and several hr of reaction at 50° and pH 5 increased the dextrose equivalent by about 10%. The sweetness increased without a notable increase in the viscosity and maltose content. The sirup had a low degree of crystallization

L12 ANSWER 69 OF 69 HCAPLUS COPYRIGHT 2007 ACS on STN

ACCESSION NUMBER: 1970:426879 HCAPLUS

DOCUMENT NUMBER: 73:26879

TITLE: Glucose sirups containing linear oligo- and

polysaccharides

INVENTOR(S): Sugimoto, Kaname; Hirao, Mamoru; Mitsuhashi, Masakazu;

Ogasawara, Junzuke

PATENT ASSIGNEE(S): Hayashibara Co., Ltd.

SOURCES: Fr. Demande, 11 pp.

CODEN: FRXXBL

DOCUMENT TYPE: Patent

LANGUAGE: French

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
FR 2005305	A5	19691212	FR 1969-9812	19690401
JP 54003939	B	19790228	JP 1968-21366	19680401
			JP 1968-21366 A	19680401

PRIORITY APPLN. INFO.:
AB The title sirups are prepared by liquefying or *gelatinizing* at 100-180° suspensions of starches with a 1,6-glucosidase and a saccharifying agent, such as organic or mineral acids or amylases (*alpha-amylase*, *beta-amylase*, *gluco-amylase*, and (or) *isomerase*) or a mixture thereof. The starches are preferably high-amylase starches or purified amylases. Thus, a 35% suspension of refined starch from sweet potatoes was *gelatinized* and dispersed for 10 min at 160° and then quickly cooled in vacuum to 50°. For each g of starch, 20 units of pullulanase (from *Aerobacter*) was added, the pH adjusted to 6 and the starch reacted for 30 min at 45°. *alpha-Amylase* (15 units/g starch) was added and the batch allowed to react at 60° and pH 6 for either 5 or 20 hr. As soon as the batches attained a dextrose equivalent (D.E.) of 20 or 70, the reaction was stopped, the products refined with C, passed over ion exchangers, and concentrated. The 20 D.E.-sirup had little sweetness and the viscosity of a 50 D.E. sirup, whereas the 70 d.e. sirup was a sweeter liquid of low viscosity and with no tendency to crystallize. By subjecting both of these sirups for several hr at 50° and a pH of 5 to the action of a *glucoamylase*, e.g. from *Rhizopus*, in the proportion of 1 unit/g of starch, the dextrose content was increased approx. 10% and the sirups obtained were sweeter without any appreciable increase in viscosity or in maltose content. Containing less dextrose than the corresponding regular sirups, the new sirups had a higher resistance to thermal breakdown.

=> s lsaaswrtqsiyflldtrfgrtdns/sqsp
L7 16 LSAASWRTQSIYFLLDTRFGRDTDNS/SQSP

=> s l7 and sql=484
72339 SQL=484
L8 6 L7 AND SQL=484

COST IN U.S. DOLLARS	SINCE FILE ENTRY	TOTAL SESSION
FULL ESTIMATED COST	150.20	150.41

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FILE LAST UPDATED: 8 Aug 2007 (20070808/ED)

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=> s l8
L9 6 L8

=> d l9 1-6

L9 ANSWER 1 OF 6 HCAPLUS COPYRIGHT 2007 ACS on STN
AN 2005:1261024 HCAPLUS
DN 144:5525
TI Production of ethanol from enzymatically hydrolyzed starch
IN Bhargava, Swapnil; Frisner, Henrik; Bisgard-Frantzen, Henrik; Tams, Jeppe Wegener
PA Novozymes North America, Inc., USA; Novozymes A/S
SO PCT Int. Appl., 54 pp.
CODEN: PIXXD2
DT Patent
LA English
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2005113785	A2	20051201	WO 2005-US16390	20050511
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW				

RW: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM,
AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK,
EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT,
RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML,
MR, NE, SN, TD, TG

CA 2566252 A1 20051201 CA 2005-2566252 20050511
EP 1751295 A2 20070214 EP 2005-754334 20050511
R: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE,
IS, IT, LI, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, AL, BA,
HR, LV, MK, YU
IN 2006CN04176 A 20070622 IN 2006-CN4176 20061113
PRAI US 2004-570727P P 20040513
US 2004-632201P P 20041201
US 2004-633293P P 20041203
WO 2005-US16390 W 20050511

L9 ANSWER 2 OF 6 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 2005:1075548 HCAPLUS

DN 143:345492

TI Enzymic starch liquefaction process for improved ethanol production

IN Bhargava, Swapnil; Bisgard-Frantzen, Henrik; Frisner, Henrik;
Vikso-Nielsen, Anders; Johal, Malcolm

PA Novozymes North America, Inc., USA; Novozymes A/S

SO PCT Int. Appl., 30 pp.

CODEN: PIXXD2

DT Patent

LA English

FAN.CNT 2

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2005092015	A2	20051006	WO 2005-US9218	20050318
	WO 2005092015	A3	20060727		
	W:				
	AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH,				
	CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD,				
	GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,				
	LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI,				
	NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM,				
	SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW				
	RW: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM,				
	AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK,				
	EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT,				
	RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML,				
	MR, NE, SN, TD, TG				
	US 2007141689	A1	20070621	US 2006-593164	20061018
PRAI	US 2004-554615P	P	20040319		
	US 2004-575133P	P	20040528		
	WO 2005-US9218	W	20050318		

L9 ANSWER 3 OF 6 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 2005:696593 HCAPLUS

DN 143:192412

TI Processes for producing a fermentation product, such as ethanol, from
milled starch without gelatinization using glucoamylase from Athelia
rolfsii and acid α -amylase

IN Allain, Eric; Wenger, Kevin S.; Bisgard-Frantzen, Henrik

PA Novozymes North America, Inc, USA; Novozymes A/S

SO PCT Int. Appl., 96 pp.

CODEN: PIXXD2

DT Patent

LA English

FAN.CNT 2

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2005069840	A2	20050804	WO 2005-US1147	20050114

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW

RW: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

EP 1745122 A2 20070124 EP 2005-711438 20050114

R: AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LI, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, AL, BA, HR, LV, MK, YU

PRAI US 2004-537071P P 20040116

US 2004-636013P P 20041214

WO 2005-US1147 W 20050114

L9 ANSWER 4 OF 6 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 2004:1059495 HCAPLUS

DN 142:22620

TI Brewing with simultaneous saccharification of starch

IN Olsen, Hans Sejrr; Norman, Barrie Edmund; Wuempelmann, Mogens; Tams, Jeppe Wegener

PA Novozymes A/S, Den.

SO PCT Int. Appl., 43 pp.

CODEN: PIXXD2

DT Patent

LA English

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2004106533	A1	20041209	WO 2004-DK373	20040528
	W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW				
	RW: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
	EP 1633878	A1	20060315	EP 2004-735196	20040528
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, FI, RO, CY, TR, BG, CZ, EE, HU, PL, SK				
	CN 1798847	A	20060705	CN 2004-80015139	20040528
	US 2007031952	A1	20070208	US 2005-558552	20051128
PRAI	DK 2003-812	A	20030530		
	WO 2004-DK373	W	20040528		

RE.CNT 11 THERE ARE 11 CITED REFERENCES AVAILABLE FOR THIS RECORD

ALL CITATIONS AVAILABLE IN THE RE FORMAT

L9 ANSWER 5 OF 6 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 2004:780639 HCAPLUS

DN 141:294792

TI Alcohol product processes

IN Olsen, Hans Sejrr; Pedersen, Svend; Festersen, Rikke Monica

PA Novozymes A/S, Den.

SO PCT Int. Appl., 43 pp.

CODEN: PIXXD2

DT Patent

LA English

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PI	WO 2004080923	A2	20040923	WO 2004-DK154	20040310
	WO 2004080923	A3	20041216		
	W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW				
	RW: BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
	US 2004219649	A1	20041104	US 2004-797393	20040310
	EP 1604019	A2	20051214	EP 2004-718914	20040310
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, PL, SK				
	CN 1788083	A	20060614	CN 2004-80012682	20040310
PRAI	US 2003-453326P	P	20030310		
	WO 2004-DK154	W	20040310		

L9 ANSWER 6 OF 6 HCAPLUS COPYRIGHT 2007 ACS on STN

AN 2002:368675 HCAPLUS

DN 136:385041

TI Secondary starch liquefaction in fermentation ethanol production

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SO PCT Int. Appl., 33 pp.

CODEN: PIXXD2

DT Patent

LA English

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
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PI	WO 2002038787	A2	20020516	WO 2001-DK737	20011109
	WO 2002038787	A3	20020926		
	W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW				
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	AU 200213841	A	20020521	AU 2002-13841	20011109
	EP 1335982	A2	20030820	EP 2001-982195	20011109
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR				
	US 2004091983	A1	20040513	US 2003-416393	20030509
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PRAI	DK 2000-1676	A	20001110		
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	DK 2000-1854	A	20001211		
	US 2000-256015P	P	20001215		
	WO 2001-DK737	W	20011109		
	US 2003-416393	A3	20030509		